Final Report

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on

# Evaluation of the Data for Decision-Making (DDM) Project in Bolivia

Marguerite Pappaioanou, DVM, MPH
Karen Wilkins

International Branch
Epidemiology Program Office
Centers for Disease Control and Prevention
1600 Clifton Road
Atlanta, Georgia 30333

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by

Mary Odell Butler, PhD
Principal Investigator

Jade Vu Henry, MPH

BATTELLE
Centers for Public Health Research and Evaluation
2101 Wilson Boulevard, suite 800
Arlington, VA 22201

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### I. Statement of the Problem

(pp. 2-12) This report presents results of the final evaluation of the Data for Decision Making Project (DDM) conducted by CDC in Bolivia from 1992 to 1994.

The DDM Project was initiated by USAID in September of 1991 to help public health agencies in participating countries mobilize data to support public health. DDM/CDC was established under a Participating Agency Service Agreement (PASA) between USAID and the Epidemiology Program Office at CDC to deliver the public health training components of the program. CDC has now implemented DDM projects in 10 countries in Latin America, Africa, and Asia.

DDM is a part of the Epidemiology Program Office's mission to support the development of public health infrastructure in the international arena to help prevent and control imported diseases. The DDM program is one of two models for training of public health professionals used by EPO's International Branch. The Field Epidemiology Training Program (FETP), modeled after CDC's Epidemic Intelligence Service (EIS), seeks to build infrastructure in participating Ministries of Health by delivering two years of training to entry-level public health professionals. DDM differs from this model in that it aims to provide applied, on-the-job training to public health professionals who have been on their jobs for some time. Some experts feel that DDM is a more practical route for training in countries with small health systems

and inadequate resources to either support an FETP or to absorb the large number of career epidemiologists such a program would produce.

DDM/Bolivia was implemented in 1992, at the request of the Bolivian Ministry of Health after completion of a preliminary study and a country needs assessment by CDC. ' The program was housed in the Child and Community Health Project (CCH), a project of the Bolivian Secretaria Nacional de Salud (SNS) that is supported completely by USAID. The program delivered training and technical assistance in epidemiology, biostatistics, management, and communication skills, with an emphasis on application of these tools to programmatic problem solving. Three two-week workshops were held at six-month intervals with on-the-job applications implemented by participants during the inter-workshop periods. DDM consultants visited to provide technical assistance to participant applications midway through the interim period. The DDM project ended in March 1994 with a conference in which participants presented the results of their applications of DDM skills to health policy makers.

Sustainability was an especially important outcome of DDM from the perspective of CDC and of the Bolivian supporters. It was hoped that a cohort of Bolivian trainees would go on to "train the trainers" so that the benefits of DDM would diffuse through the Bolivian health infrastructure to successively more local levels of the health system. In 1996, CCH is proceeding with a second phase of DDM Bolivia to train health professionals at the district level to carry out data-driven public health planning and advocacy. DDM Phase 2 will add a module on "social medicine" to the epidemiology/biostatistics, management, and communications modules from Phase 1. The new module is designed to educate district officials to advocate for health priorities.

(pp 12-16) ***The Bolivian Context.*** The Bolivian Secretaria Nacional de Salud (SNS) regulates a broad health system that includes disease prevention and control, but also provision of medical services to most Bolivians. Public health programs are delivered by SNS but also by a number of external organizations, PAHO/WHO, public and private medical providers, mission facilities, and local health promoters. Coordination of this complex system of health organizations is a major function of SNS.

The Sistema Nacional de Informacion en Salud (SNIS) is the national system for data collection on health and disease that is used to support operational planning in the . Bolivian health sector. SNIS data are used to support annual operational planning linking services to needs, to assess how well local health organizations are meeting targets for outreach and preventive services, and to show the distribution of diseases like tuberculosis and chronic conditions.

The way in which priorities are set in Bolivia is clearly a key factor in the potential of DDM to influence them. Priorities are established at the national level and are based on high-risk populations and socioeconomic status. They favor populations with high mortality but accessible for intervention. For instance, women and children are targeted because they are at risk for preventable disease. At the regional level, annual

planning is based on existing SNIS data and projections concerning the population, the services available, and epidemiology data.

There have been significant changes in the organization of health and other social services in Bolivia during the three years since the implementation of DDM in 1992. The Law of Popular Participation (LPP) enacted in April 1994 moves some of the responsibility for health planning from the district level to 305 municipios. This created uncertainty about how data can be linked to decision making under the new system. The LPP was scheduled to begin operating in January 1996, a month after our visit and the cut-off date for Bolivian data collection.

## II. Evaluative Objectives

(p. 17) The objectives of the evaluation were to document the process of program implementation in Bolivia, describe the outcomes of the program in terms of improved use of data for public health decision making, and compile data CDC can use to design or modify other implementations of DDM that are now operating or that may be initiated in the future in Bolivia and elsewhere.

DDM/Bolivia was the first of the DDM/CDC projects to be implemented. It typifies the DDM model of integrated training in epidemiology, management, and communications on which CDC would like to base future DDM projects. An important objective of this evaluation was to capture the lessons learned in this first completed DDM experience.

This evaluation built on a CDC baseline study in 1990, a CDC needs assessment conducted in 1991, and a mid-point evaluation study completed in 1993. For this study, the previous work supported development of a conceptual model for this evaluation, guided indicator definition and instrumentation, and yielded data on program development and implementation.

## III. Methodology

(p. 17) The evaluation methodology used in this study had five steps: (1) define a conceptual model for how the program was intended to operate, (2) derive study questions and indicators and instruments from the conceptual model, (3) develop a research protocol to guide evaluation of the model, (4) conduct data collection, and (5) complete data analysis. Conclusions were developed by assessing observations against the conceptual model.

***Defining the Conceptual Model.*** The conceptual model for DDM/Bolivia incorporates hypotheses on paths by which DDM was intended to achieve its objectives and on how programmatic and contextual factors affected execution of the design. According to those who designed the program, CDC and CCH were to deliver workshops and technical assistance to Bolivian public health professionals that were to result in focused applications of data to public health problems encountered by

participants in their jobs. Lessons learned in these applications were to be extended to public health practice through application of data to solving health problems. Improved data would then be used by policy makers to support public health decisions. Contextual factors affect the ability of CDC/CCH to deliver the DDM program or the capacity of Bolivian public health staff to implement and extend what they have learned or the willingness of decision makers to make data-based decisions. The conceptual model was based on documents and interviews with CDC staff who designed the program. The criterion for adequacy of the model was agreement of CDC program staff that the model indeed represented what they were trying to do with DDM\Bolivia.

***Deriving Study Questions and Indicators.*** Study questions were derived from the model to assess each possible linkage or path in the model. Qualitative indicators to generate answers to study questions were then constructed and incorporated into data collection instruments.

***Developing the Research Protocol.*** We developed a research protocol to govern data collection and data management. The protocol served as a standard procedural guide for all participants in all phases of the research from initial data collection to final analysis.

***Data Collection.*** *Two* sources of data were documentary evidence collected from CDC and from Bolivian agencies that implemented DDM, and interview data collected at CDC and in a 14-day field trip to Bolivia in November 1995, 18 months after the completion of DDM Phase l. Documents included design and needs assessment documents, the DDM course materials, reports of previous studies and reviews of DDM/Bolivia, and field reports compiled by CDC and CCH staff during program implementation. We reviewed and abstracted documents prior to developing the research protocol.

Interviews at CDC were conducted both before and after field data collection in Bolivia, serving to support conceptualization of the evaluation and to clarify and amplify our field data on our return. In addition, we had an opportunity to talk to a visiting CCH staff member at CDC two weeks prior to leaving for Bolivia to conduct a preliminary review of the instruments.

Activities in Bolivia consisted of an initial briefing for DDM staff, eight days of data collection, one day of preliminary data analysis, and one day of reporting and wrap-up activities, including a final briefing of CCH and USAID staff. Interviews were conducted by two-person teams with DDM participants, a comparison group of non-participants with jobs similar to those of participants, officials of the Bolivian Secretariat of Health at the national and regional levels, and senior officials of organizations external to the Bolivian government who fund and conduct important health programs in the country. In addition, we visited a local health unit to clarify our understanding of the context of DDM and to assess its impact on health operations. We selected interviewees using criteria defined as part of the protocol. CCH contacted interviewees and arranged interviews. All interviews were conducted in Spanish using instruments :translated into Spanish with input from CCH staff.

*Data Analysis.* There were two levels of data analysis: a preliminary analysis in Bolivia and a final analysis completed after we returned from Bolivia. Interview data were translated into English and typed into WordPerfect files, and a preliminary analysis supported an exit briefing for CCH and USAID. On our return to the United States, interview notes were amplified and verified from tapes. Corrected interview summaries were analyzed using a text analysis software, Ethnograph®.

All analysis was supported by a code book defining indicators and linking them to instruments and elements of the model. Interview data were coded independently by the two interviewers who collected them and reconciled by a third. Once final coding was completed, Ethnograph® was used to assign codes to passages or fields within interview transcripts, condense data for specific indicators, and produce reports of findings on specific study questions or model elements. A completed analysis contained all comments across all interviews relative to a single item. These were then used to support data synthesis and development of conclusions.

## IV. Major Findings and Recommendations

We assessed the conceptual model by sorting the analyzed data into four categories of findings. Program implementation findings deal with delivery of the DDM training program in Bolivia. Program outcomes describe the skills acquired by participants from the DDM program. Program impacts link trainee outcomes to the use of data for public health decision making. Contextual factors are political, economic, or social forces that influenced the operation of DDM in Bolivia.

***Findings on Program Implementation.***

(pp. 37-48) There were 41 individuals originally enrolled in DDM, 39 of whom completed the course. Of 40 participants we were able to identify from documentary sources, 11 were national program directors, 20 were regional staff, and 9 were directors of district health programs. Eight participants were from the PAHO/WHO Expanded Programme on Immunization (EPI). Participants were selected by the Ministry of Health (now the National Secretariat of Health) on the basis of previous epidemiology training and current employment. There was no prescribed selection process or set of selection criteria.

At the start of the DDM program, all of the trainees we interviewed had enough authority in their respective domains to be able to implement their projects. At the time of our 1995 interviews, two of nine participants had been demoted or had lost a job, "for political reasons." One of these had taken a lower position in the same agency. Another works part-time for a foreign health organization as a technical advisor.

The three workshops were delivered as planned in August 1992 (Applied Epidemiology and Biostatistics), March 1993 (Applied Management), and September 1993 (Epidemiology and Communications in Public Health). Course materials were developed collaboratively by CDC and Bolivian staff before DDM was launched. In

addition, instructors for each workshop met to plan the course before going to Bolivia to deliver it. Because Bolivia was the first country to implement this program, there was a great deal of support from CDC in terms of staff interest. Numerous experienced, senior CDC staff, often heads of important CDC programs, came to teach courses.

The practical orientation of the program and its linkage to on-the-job activities were very important to participants. Many participants contrasted the DDM experience favorably to other training they had had in epidemiology and public health that was more abstract, academic, and removed from their daily experience. The modules on communication in the first and third workshops were special favorites.

Implementation problems mentioned were unevenness in the preparation of participants for the courses and appropriateness of the course material to the Bolivian experience. The first workshop was the most problematic of the three in terms of the fit between instructor and participant preparation. The workshop was originally conceived as a mini-EIS course, but the instructors had to adjust their lectures when they discovered that most participants came from clinical backgrounds and needed basic training in epidemiologic principles. The instructors felt that the sessions in applied management and communications were more effective because they focused only on the basics and utilized more interactive teaching techniques.

Some participants felt that.the case studies were not relevant to health problems in Bolivia. A language issue arose only once in connection with the workshops. At an early statistics workshop done by a non-Spanish speaking instructor, the translator used was not sufficiently versed in statistics to present the material adequately in Spanish.

Projects undertaken between workshops were supervised, in-service applications of skills learned. Guidance to ongoing projects came from two sources: supervisory visits by CDC instructors about halfway between workshops and ongoing technical assistance from CCH staff. CDC consultants made one visit between each of the workshops to provide technical assistance for DDM trainees. CDC technical assistance teams went to a location convenient to the work sites of participants, setting up appointments in La Paz, Sucre, Santa Cruz, and Cochabamba.

Six of the nine participants interviewed found technical assistance delivered by CDC to be useful and appropriate, especially in data analysis, Epi-Info, and presentation skills and graphics. From the CDC perspective, there was some frustration expressed with the experience of providing technical assistance because participants were often not prepared to take advantage of technical assistance visits. One CDC consultant expressed the need for more time to help trainees not only develop their projects, but review basic epidemiologic concepts. Another felt that there should have been more local staff available to reinforce material from the workshops as well as more formal mechanisms of trainee supervision. These impressions are supported by field reports of technical assistance trips reviewed for this study, which showed that only about one-half of the participants had projects far enough along for technical assistance to be useful.

*(pp. 48-59)* ***Findings on Program Outcomes.***

Program outcomes are changes in public health practice subsequent to participation on DDM/Bolivia. The outcomes highlighted by participants themselves differed depending on their responsibilities. National program directors emphasized planning and communication skills, while valuing the ability to use epidemiological data for planning. Regional staff focused on epidemiology and data analysis skills. The district-level interviewee uses DDM skills in management of training of incoming physicians delivering services in his district. Sharing training with colleagues was reported by both participants and non-participants. DDM participants delivered training explicitly derived from their DDM experience.

Many informants mentioned data-driven activities connected to their DDM participation and were able to give specific examples of data used to support surveillance and planning for delivery of services. Participants felt that better analysis of existing data rather than new modes of data collection or outbreak investigation were most important. Better processing and utilization of SNIS data were important assets of DDM training for some. Non-participants also use data for surveillance and operational planning, but had less personal involvement with data analysis than did participants.

The majority of participants and non-participants said that computers had become more important to their agencies over the past two years. Three participants attributed their own involvement in this shift to what they had learned in DDM, but the shift toward computers appears equally strongly among non-participants. Participants gave us examples of ways in which they had used new modes of computerized data analysis to improve the methodology of planning and priority setting in their programs.

We saw no evidence that DDM led to changes in the kinds of planning occurring. Our data show that participants and non-participants alike do annual, operational planning for their programs. Only those located in national public health programs participated in strategic planning. Except for cases in which development of a plan was part of a DDM project, planning was not affected by DDM beyond the increased capacity of DDM participants to mobilize data in support of all of their activities.

j *(pp. 59-63)* ***Findings on Program Impact.***

Program impact refers to change in Bolivian public health decision making because of data generated by DDM trainees. For an impact to appear, well-analyzed data must be presented to decision makers and decision makers must use the data in decisions. Impacts observed came from DDM participants who were themselves heads of programming organizations and were able to implement their projects in their own organizations. In other cases, implementation of projects was either prevented or interrupted by political changes associated with reorganization of health services during decentralization under the Law of Popular Participation (LPP).

Stability of DDM participants in their jobs was hypothesized to be a key factor affecting the impact they could have on policy. There was a perception at CDC and in Bolivia that political change had led many participants to lose their jobs. However, this perception was not supported by our data. Among our participant interviewees (selected before their current employment was known), only one had been demoted and one ousted for political reasons. Many Bolivian interviewees from government and participant interviews observed that most of their colleagues from DDM were still working in the public health sector somewhere.

*(pp. 63-65)* ***The Role of Contextual Factors.***

There are limitations to the capacity of DDM trainees to make an impact on public health programs in Bolivia because of the way in which public health planning is done and because of uncertainty about the future of public health in that country. Interviewees from all categories of respondents in Bolivia raised issues of the ability of DDM participants to affect decisions-limitations that have little to do with their positions, their training, or the efficacy of DDM. The most important of these are the political nature of decision making in public health in Bolivia and inertia in the system.

Possibly the dominant contextual factor affecting the success of DDM in Bolivia is the impending decentralization under the LPP. Public and private actors in health have interrupted their regular operations to monitor the progress of decentralization and its implications on the configuration of health care in Bolivia. DDM outputs currently have little influence on public health decision making simply because public health decision making has come to a stand-still.

We also heard a great deal about the impact of decentralization and uncertainty about the future of public health in Bolivia on all health programs including DDM. There was some feeling that Bolivian priorities were eclipsed by the dependence of much of the Bolivian health sector on categorical funding from international and foreign organizations.

*(pp. 68-73)* ***Study Conclusions.***

Overall, Bolivian participants were very pleased with their DDM experience, especially with their enhanced ability to complete computer analyses of existing data. Implementation was logistically smooth, with materials showing up on time, instructors being qualified and prepared, participants eager and excited by the experience. The major implementation problem was that DDM tried to deliver too much material in too little time. Almost everyone expressed this concern in some way: that there was not enough time for exercises, communication practice, discussions, software practice. Also, the unsystematic selection of participants resulted in a mixture of preparations and backgrounds that was a problem for those preparing and delivering course material.

DDM was effective in helping participants improve their use of data and link data to decision making in their management projects. The management and analysis of existing data sources, such as the Sistema Nacional de Informacion en Salud (SNIS), and the streamlining of procedures for producing data, were important outcomes in data analysis and data management. The outcomes of the management and communication aspects of the program are less certain. It was clear from our interviews that participants could do these tasks, but few of them were doing so at present as a regular practice.

The evidence across all of our interviews in Bolivia shows that computerization in the Bolivian health sector is well under way and that Epi-Info is becoming a standard for analysis of epidemiologic data. But DDM participants often could not obtain sufficient access to computers between workshops to get the practice needed to become adept at Epi-Info.

Several important and interesting projects were implemented as a result of DDM that probably would not have been done-at least not in this data-driven and rational fashion-without the program. But we found little evidence that DDM/Bolivia had built a structure for moving data from the epidemiologists who collected them to the public health planners in SNS who can use the data to set public health priorities and budget allocations. DDM/Bolivia lacked involvement of public health planners and the program provided no benefits to them for participating.

The impact of the management component of DDM/Bolivia is obscured by the changing Bolivian political structure and cannot be fairly be evaluated at this time.

Many Bolivian health officials expressed the importance of moving away from politically based decisions to more rational, data-driven ones. But it is also true that it is in the nature of public health to be driven by political context. The contextual competence of a program like DDM depends on the degree to which it is able to maintain an impact on the application of data to health decisions, even if the mechanisms for making those decisions change.

The most important factors governing the impact of DDM at the present time are decentralization and the uncertainty that people have about public health jobs while the precise steps toward implementation of the Law of Popular Participation are developed. But DDM is about decision making at whatever level it occurs. There are some events that are likely no matter how local decision making is defined. Health service providers will still be responsible for compiling health information and moving it to the district and regional level. There will still be SNIS and the CAIS. And for employees of SNS, career decisions will still be subject to the factors that govern them today.

**Recommendations.** On the basis of this evaluation, we can make several recommendations to CDC as it moves on to develop DDM programs for implementation in other countries. Several of these may be useful to CCH in implementing DDM, Phase 2 in Bolivia.

(pp. 66-67) **Recommendations of Participants for Changes in DDM.**

We asked DDM/Bolivia alumni what changes they would recommend based on their experience. Their responses were quite diverse, possibly reflecting the variety of their backgrounds and current employment. Common themes were:

- Computer software tools were useful, and people need more time to master them.
- The applied nature of the course is good, but it sought to cover too much material in too little time.
- The course should be directed to district and local staff who work directly in health programs and do operational planning that can be informed by data.

(pp. 73-74) **Recommendations for DDM Implementation**

***CDC should require that DDM implementors in host countries develop clear criteria for including participants in the course.*** It is not necessary, and probably political unwise for CDC to specify what these criteria should be. But knowledge of selection criteria is an essential support in developing training and technical assistance materials to be delivered to participants.

***CDC should package DDM materials so that self-study is an option.*** Much of the material that supports DDM courses is standard from country to country. Materials can be developed in a standard module with case-studies and other materials prepared for specific countries. This will rationalize the DDM approach, standardize delivery across instructors, and help to expand usage of DDM materials beyond the core group of participants to other public health professionals in the country. In addition, standard exercises and information can be given to participants to prepare for courses and to reinforce course materials between workshops.

***DDM should be based on state-of-the-art technologies for training and communication.*** DDM should go beyond manuals and other documents to employ the range of communication technologies available almost everywhere in the world at the present time. This includes Internet access to updates and data, direct e-mail linkages to CDC, computer software, videotapes, and audio-cassettes.

***CDC should work with in-country implementors of DDM to tailor a proactive procedure for supervising projects and helping participants through problem areas.*** DDM shows us that participants are unlikely to call in for help. There needs to be a plan for linking participants with in-country supervisors and technical advisors that originates with the implementing organization.

(p. 74) **Recommendations for Improving DDM Outcomes.**

*CDC should seriously consider building DDM in such a way that all participants are provided with laptop computers.* Participants must have the hardware to become adept at Epi-Info and other computer analyses at their own pace. This also would assure that computers are handy for use in the field where contingencies arise, and reinforce for trainees the practice of using computers on a routine basis, rather than just during DDM-related activities.

(pp. 74-76) **Recommendations for Strengthening Impact**

***CDC should articulate the benefits of DDM to planners and should seek participation of public health planners early in the DDM process.*** As part of the needs assessment preceding DDM, CDC and Ministry of Health staff should determine the locus within the MOH for budget and programmatic planning. Key persons from this organizational unit should be brought in prior to DDM implementation and should help develop specific methods for bringing data to bear on the decision-making process in their organizations. This will assure that DDM is realistic in terms of how data can be brought into the process for decision making used in the host country. In addition, the DDM process can itself begin forging the professional relationships that can lead to the application of data to decisions.

***CDC should build on existing public health practices as much as possible.*** As part of preparation for implementing DDM, CDC should review existing surveillance and health data in a search for opportunities to match DDM to existing structures. This helps ensure a program that will be maximally useful because it helps participants improve the utilization of the data they need to collect anyway. And it will help strengthen the existing health information systems, promote ownership of DDM, and foster acceptance of innovations resulting from its implementation.

***CDC should build procedures for handling political change into the DDM process.*** CDC should have explicit procedures to reassessing program direction in the event of significant political change affecting DDM. Normally, this will be a simple process of pulling back from planned activities, taking stock of the short- and long-term impacts of the change, and modifying the plan to accommodate new circumstances to the the extent feasible or desirable. Written, mutually understood procedures for handling political change can help avoid the situation in which program implementors march straight ahead with planned activities even though a readjustment of program objectives and the means for reaching them is advisable.

***CDC should reinforce the importance of dissemination of information by encouraging development of a network of alumni in the host country.*** A DDM Alumni Association could be designed and incorporated into the procedures for implementing the DDM course itself. This will improve dissemination of data from workers to policy makers and help create a sustainable DDM infrastructure. Establishment of a professional network with a core of DDM graduates would support

later phases of program implementation and contribute to sustainability by providing a resource to support later DDM-type training.

(p. 76) **Recommendations for Sustainability**

***CDC should put a more explicit statement of the training mission into DDM.*** The impact of DDM on the health system as a whole can be strengthened by building into the DDM package,. perhaps in the management section, an exercise in how to deliver training and technical assistance to staff in a public health practice. Participants need to understand that extending their training to colleagues is an important outcome of their participation in DDM. This will reinforce the value to participants in passing their experience on to others and will provide them with tools to do so.

(p. 76) **Implications of DDM for Public Health in the United States**

CDC should not overlook the implications of this project for building public health infrastructure in the United States. As CDC goes on to standardize and package DDM for use in other countries, they should also consider a program that can be used in the United States by state and local health officials facing new challenges in our own era of decentralization. The methodology of DDM-brief workshops with technical assistance in accomplishing on-the-job projects-would work as well in the U.S. as it does in Bolivia.

# 1.0 Introduction

This report presents results of the final evaluation of the Data for Decision Making (DDM) Project conducted by the Centers for Disease Control and Prevention (CDC) in Bolivia from 1992 to 1994. The objectives of the evaluation were to:

Document the process of program implementation in Bolivia,

Describe the outcomes of the program in terms of improved use of data for public health decision making, and

Compile data that CDC can use to design or modify other implementations of DDM that are now operating or that may be initiated in the future in Bolivia and elsewhere.

Battelle conducted this evaluation from a research protocol developed by Battelle on the basis of a preliminary review of documents and interviews with CDC staff who had guided the development and implementation of DDM/Bolivia. Using the protocol, we conducted a two-week study in Bolivia during which we interviewed Bolivian program implementors, DDM/Bolivia participants, and other individuals from the Bolivian health sector. Analysis of interview data was initiated in Bolivia and completed after our return from the field. This report presents the results of this evaluation.

## Preview of the Report

Following this Section 1 introduction, Section 2 presents the history of the program, summarizes previous relevant research, and discusses the Bolivian context in which the program unfolded. In Section 3, we present an impact model illustrating how program designers envisioned DDM/Bolivia operating in order to achieve the intended results. Following this, we describe the design and execution of the methodology to assess this impact model. Section 4 presents the results of our assessment of the impact model. Section 5 discusses our conclusions and recommends actions for bringing the Bolivian experience to bear on other implementations of DDM.

# 2.0 Description of DDM

In this chapter, we describe DDM/Bolivia and the political context in which it was implemented. DDM/Bolivia was the first of several DDM projects implemented by CDC in cooperation with USAID. Therefore, we begin our examination of DDM/Bolivia with a brief discussion of the overall strategy of DDM as a whole and the role of DDM in the mission of the International Branch of CDC's Epidemiology Program Office (IB/EPO). We follow this with a description of DDM/Bolivia and of the changing Bolivian health system surrounding the program.

## The Data for Decision Making Concept

The DDM Project itself was initiated by USAID in September of 1991 as a five-year project to support public health organizations in participating countries to mobilize data in support of setting health priorities, formulating health policies, obtaining and allocating resources for health, and mobilizing public health prevention and disease control interventions and programs.[1]

DDM/CDC was established at about the same time under a Participating Agency Service Agreement (PASA) between USAID and the Epidemiology Program Office/CDC to deliver the public health training components of the program.[2]

The goals of DDM/CDC are to enhance decision making in the health sector by strengthening the capacity of decision makers at the policy, program, and facility levels to identify health needs, use all relevant information to solve health problems, and optimize the allocation of health resources. A second goal is to enhance the skills of in-country technical advisors in supporting use of data and communication of information to policy makers. Finally, DDM/CDC seeks to improve the availability and use of information systems in support of public health activities. The program is

[1] *Data for Decision Making, October 1, 1991-June 30, 1994: Report of PASA Activities.* CDC/PHS. December 12, 1994.

[2] DDM had two components: "Infotech" delivered by CDC and "Policytech" delivered by a consortium of the Harvard School of Public Health, the Research Triangle Institute, and Intercultural Communications, Inc. This report deals only with DDM/CDC.

geared to achieve these outcomes, in political environments in which non-health factors can be expected to have a substantial influence on public health decisions. CDC has currently implemented DDM projects in 10 countries in Latin America, Africa, and Asia.

## The DDM Program in the CDC Context

An important part of the IB/EPO mission is to support the development of public health ¡nfrastructure in the international arena not only to help other countries strengthen this function but to prevent and control imported diseases. This mission grows in importance as air transport and dislocations of populations make international boundaries increasingly penetrable, certainly as far as ¡nfectious diseases are concerned.

The DDM program is one of two kinds of international epidemiology training provided by IB/EPO. The Field Epidemiology Training Program (FETP), modeled after CDC's Epidemic Intelligence Service (EIS), builds infrastructure in participating Ministries of Health (MOH) by delivering two-year training programs geared to entry-level public health professionals. Generally FETP participants are recruited and funded by the Ministry of Health in their respective countries to complete training in preparation for MOH service. FETP trainees leave their jobs during the training period with the expectation that they will be provided entry to a career track in the MOH on completion of their training. The focus in FETP, as in EIS, is on applied training in field epidemiology and outbreak investigation.

DDM differs from this model in that it aims to provide on-the-job training to public health professionals who have been on their jobs for some time. DDM participants receive training in epidemiology, biostatistics, management, and communication that is targeted to practical applications. Participants are expected to remain on their jobs during their participation in DDM, to develop projects relevant to their own jobs, and to implement them as an outcome of their participation.

Early implementors of DDM/Bolivia had to sell the DDM model to CDC staff accustomed to the more defined epidemiology training that characterized the EIS and its offspring, the FETP. The focus on short-term on-the-job training and broad coverage of applied epidemiology, management, data systems, and communication skills was a sharp departure from the FETP model. There was some feeling at CDC that the best form of training was that focused on "what CDC does best," i.e., epidemiology targeted to disease control.

Others at CDC felt that DDM was a much more practical route for training in Bolivia than was FETP because Bolivia has a small public health establishment and inadequate resources to either support an FETP or absorb the large number of career epidemiologists such a program would produce. FETP is costly, $200,000 to 300,000 per year, more than can be raised by the Ministry of Health in a small country. An additional consideration was the political nature of public health employment in Bolivia. Public health jobs are political prizes, likely to be lost if incumbents leave them for any period of time. One informant told us that two people from the Ministry of Health lost their jobs during their participation in a four-week Atlanta course in 1990.

Another CDC program that worked in concert with DDM/ Bolivia was the Sustainable Management Development Program (SMDP) initiated by the Public Health Practice Program Office (PHPPO) in 1992 to strengthen management training capacity for local health officials in developing countries. SMDP shares with DDM an applied focus but is directed more to the articulation of data and decision making. The program conducts an annual Management for International Public Health (MIPH) course in Atlanta for trainers who will return to their countries and launch in-country training programs in data-gui0ed management. The CCH staff person who heads DDM/Bolivia and the management trainer designing DDM Phase 2 have both completed this course.

## Description of DDM/Bolivia

DDM/Bolivia was implemented by the Child and Community Health (CCH) Project with major funding coming from USAID/La Paz and technical assistance and partial financial support from DDM/CDC. CCH is a project of the Bolivian Secretaria Nacional de Salud (SNS), which is supported completely by USAID funding.

A chronology of events in the implementation of. DDM/Bolivia is presented in Table 1. The project was implemented at the request of the Bolivian Ministry of Health after completion of a preliminary study and a country needs assessment by CDC. DDM itself was a two-year program of training and technical assistance in epidemiology, biostatistics, management, and communication skills, with an emphasis on application of these tools to programmatic problem solving. Three two-week workshops were held at six month intervals with on-the-job applications implemented by participants during the inter-workshop periods. DDM consultants visited to provide technical assistance to participant projects midway through the interim period. DDM ended with a conference

Table 1. Timetable of Events for DDM Bolivia

| Date | Event |
|---|---|
| Feb - Jul 1989 | Ministry of Planning (MOP) conducts large-scale household survey in Bolivia to obtain data on child health from a national sample. |
| Mar 1990 | Preliminary investigation into health information systems and decision making in Bolivia by CDC and USAID explores areas in which assistance could be provided. |
| Jun 1990 | USAID sponsors CDC training of 22 Bolivian Ministry of Health (MOH) physicians in U.S. |
| Dec 1990 | Subsistema Nacional de Informacion en Salud (SNIS) initiated to provide standard health data to a national system. |
| Apr 1991 | Results of MOP household survey published. All districts now reporting to SNIS. |
| Nov 1991 | USAID requests CDC to provide short-term technical assistance to Bolivia in developing the DDM Bolivia project. |
| Mar 1992 | CDC Country Assessment for DDM in Bolivia. Workplan prepared by CDC for DDM Bolivia. |
| Jul 1992 | CDC Monitoring and Evaluation Plan developed. |
| Jul - Aug 1992 | Workshop 1 proposed in work plan. |
| Aug - Sep 1992 | Workshop 1 on epidemiology and biostatistics conducted in Bolivia. |
| Nov - Dec 1992 | Workshop 1 follow-up visits conducted by CDC staff. |
| Jan - Feb 1993 | Second set of Workshop 1 follow-up visits by CDC. |
| Mar 1993 | Workshop 2 on applied management skills conducted in Bolivia. |
| May 1993 | Workshop 2 follow-up visits by Nur University, Santa Cruz. |
| Jul 1993 | Workshop 2 follow-up visits conducted by CDC staff. |
| Aug 1993 | Mid-term assessment of DDM Bolivia conducted by James Becht. |
| Sep 1993 | Workshop 3 on applied epidemiology and communication conducted. |
| Mar 1994 | National Conference on the Use of Data for Decision Making held in La Paz. |
| Aug 1995 | Needs assessment conducted to guide development of Phase 2 of DDM Bolivia. |
| Nov 1995 | Data collection for final assessment of Phase 1 of DDM Bolivia. |

during which participants presented to health policy makers the results of their applications of DDM skills.

DDM/Bolivia typifies the DDM model of integrated training in epidemiology, management, and communications on which CDC would like to base future DDM projects. The objectives of DDM/Bolivia were to assist public health practitioners in using data to assess public health needs, design and deliver interventions that would meet these needs, and advocate effectively at all levels of government for the resources needed to protect the public health. It was CDC's hope that the implementation of DDM/Bolivia would also build the basis for long-term cooperation between public health experts at CDC and in Bolivia.

From the Bolivian perspective, the idea of short-term training in epidemiology for Bolivian health officials was not new. Before DDM/Bolivia began, a CDC staff member serving as a Technical Advisor for AIDS and Child Survival (TAACS) in USAID/Bolivia began investigating ways to provide short-term training in data management and data analysis skills while building cooperative linkages between public health staff in Bolivia and technical staff at CDC. In 1990, USAID sent 22 Bolivian health officials to Atlanta for a short course in epidemiology that was taught in Spanish. This class formed the nucleus around which DDM/Bolivia was built.

One of the Bolivian officials who attended this seminar was then sub-Secretary for Health in the Bolivian Ministry of Public Health and Social Support (MSPPS). He worked with the USAID TAACS to initiate the newly developed DDM program in Bolivia. The 22 graduates of the Atlanta course were invited to participate in DDM Phase 1. This group formed a core of expertise that program developers hoped would generate a completely Bolivian DDM program in later phases.

DDM/Bolivia needed a home in the Bolivian Ministry of Health. CDC identified the Community and Child Health Project, an existing USAID-funded project with which the TAACS advisor was already working. The Director of CCH became the Director of DDM/Bolivia. The individual was trained as an economist with post-graduate training in demography. Before the beginning of DDM, his primary responsibility had been to develop an information system for CCH.

His responsibilities to DDM during the first phase of its implementation were to maintain contact with DDM staff in Atlanta, define the role of the visiting supervisors and organize their visits, and maintain liaison with USAID and other agencies on DDM activities. He estimated that, during DDM Phase 1, 80 percent of the supervision came from CDC and 20 percent from Bolivia. DDM was not his only responsibility. When there was a supervisory visit or a course, he worked on DDM

100 percent of the time. Otherwise, he devoted about 80 percent of his time to other services for CCH, especially the information systems management project.

The new Director of DDM went to Atlanta for a CDC/Emory Epidemiology for Action Course and several management courses. During this visit, he also worked with IB/EPO staff to draft the course materials for DDM\Bolivia. He remembers that the original plan was to provide instruction only in epidemiology, even though 80 percent of the likely participants were already trained as epidemiologists. The management and communications components of the course were added after developers realized that Bolivian officials very much needed these components. The module on communication was added as an afterthought and was organized very quickly. DDM Phase 1 was implemented in August 1992 and concluded in March 1994.

An agreement was made between CCH and Nur University in Santa Cruz to recruit faculty to deliver training in public health administration and management. Nur had a reputation as an effective institution and CDC thought it was a good idea to use them. For reasons that are not clear, the arrangement did not work out and CCH decided not to re-issue the invitation for DDM Phase 2. One informant suggested that part of the problem is that Nur is a for-profit institution affiliated with the Bahai religion, located in a Catholic country with somewhat socialist leanings.

**DDM Phase 2**

An especially important outcome from the perspective of CDC and of the Bolivian supporters of the program was sustainability. DDM/Bolivia was to result in a cohort of Bolivian program implementors who would go on to "train the trainers." Ultimately the benefits of DDM would diffuse through the Bolivian health system as trainers taught other public health staff at successively more local levels of the health system. In 1996, CCH is proceeding with a second phase of the project to train health professionals at the district level to carry out data-driven public health planning and advocacy. DDM Phase 2 is a completely Bolivian program to train trainers at the district level. Phase 2 will rely on a team of three trainers: an epidemiologist graduate of DDM Phase 1, a management specialist, and a communications specialist. DDM Phase 2 will add a module in "social medicine" to the epidemiology/biostatistics, management, and communications modules from Phase 1. The new module is designed to train district officials to advocate for health priorities under a decentralized Bolivian health system. At the time of our field visit, CCH was working very hard to

get Phase 2 going, but we have no data on the outcome of this effort. This evaluation is concerned solely with Phase 1 of DDM/Bolivia, begun in 1992 and completed in 1994.

## Previous Research on DDM/Bolivia

Three different data collection activities during the course of DDM implementation were useful in the design of this final assessment: a baseline study conducted by CDC in 1991, a country needs assessment in 1992, and a mid-point evaluation of the program in 1993. These studies provided a means to compare the program concept to program implementation at several points in the development of DDM.

Baseline data collected in March 1991 from staff working with the Expanded Programme for ¡mmunizations (EPI) in Bolivia showed that public health staff at the national, regional, and district levels expressed a need for better population data, training for staff in data management, and ¡mproved hardware and software support (see Table 2). These findings were reinforced by the CDC country needs assessment conducted by CDC in 1993 in response to a Bolivian Ministry of Health request for technical assistance that led to the implementation of DDM Bolivia (see Table 3.)

An especially fortuitous development for this evaluation was implementation of a mid-point assessment of progress conducted in August 1993. [3] For this evaluation, the investigators interviewed 27 of 39 DDM Bolivia participants either alone or in small groups. The findings and conclusions of this study are summarized in Table 4. In: the mid-point evaluation, it was found that participants felt positive about their DDM experience and reported that they now used more data, used it better, and communicated it better than they had before their DDM experience. They felt that their approach was now more scientific and technical. They said that they had moved from intuitive and even ¡mpulsive decision making to more objective and quantitative ways of doing things. They felt that they were now analyzing data rather than "just passing it around." They reported being more capable of organizing delivery systems and negotiating cooperation with other agencies.

The extent of behavior change among participants is harder to deduce from Becht's data. Becht assumed that increased use of data for decision making would be adequately reported by program participants. Reported applications of DDM training were restricted to preparing reports and

[3] Becht J, Anello LJ, Perez Oropeza *MV. Assessment of decision making behavior, Bolivia Data for Decision Making Project, August 9-30, 1993.* Report to the Epidemiology Program Office, CDC, September 15, 1993.

## Table 2. Summary of 1990 Baseline Study in Bolivia

| Agency | Decision Cited | Data Used | Needs |
|---|---|---|---|
| *1.0 National Level* | | | |
| EPI Program Office - MPSSP | Regional distribution of vaccine | Requests from regions, national EPI plan, inventories of supplies; PAI2 forms | Better computer support, dedicated computer; maps and graphics software |
| EPI Program Office - MPSSP | Assist outbreak investigation | Discussion with available epidemiologists; telephone and radio info; EPI form 8 | More confidence in data quality; better training for staff |
| Office of Planning - MPSSP | How to control disease | 1976 census and special surveys and disease reports | Better epi skills; fewer organizational barriers; better dissemination down |
| *2.0 Regional Level* | | | |
| La Paz Regional Epidemiology Office | Immunization strategy | EPI forms 7 and 8; 1976 census; disease reports | Inadequate number of trained computer staff, hardware and software |
| La Paz - Project Concern | Program planning and liaison with funders | Reports from Project Concern program offices; Unidad Sanitaria data | Software to process data; too many forms and not enough survey data collection in field |
| Cochabama regional epi office | How to identify and address disease problems | Disease reports from districts; PA18 | Inadequate number of trained staff; need computers |
| Cochabamba regional health planning office | Vaccine distribution | 1976 census; 1983 special census or C. area; PAI8 forms | Better census data; computer software and training; phone transmission of data |
| Cochabamba - Project Concern | Immunization strategy | Monthly meeting with HC providers | Revise forms; use different age groups for targeting |
| *3.0 District Level* | | | |
| Escoma district health office (La Paz) | Vaccine distribution | Reports from CSRA areas and non-CSRA areas, including PAI7 and PAI8 | Better census data |
| Quillacollo district office | Annual immunization plan | EPI form 8; (special) 1986 survey | Better population data; refrigerators; boots and sleeping bags |
| *4.0 Local or Community Level* | | | |
| Carabuco Office of CSRA | Field staff supervision | House-to-house census for children to be ¡mmunized every two weeks; PA17 and PAI8; lists of children yet to be immunized | PA18 doesn't show rates or number of unimmunized children; need more feedback from higher up |
| Morochata Hospital | Conducting immunization campaigns | EPI form 7 and 8 | Better population data; hospital has no electricity. |

[1] EPI = Expanded Programme on Immunization.

[2] CSRA = Consejo Salud Rural Andino.

Project Concern = another private voluntary organization (PVO) providing primary health care and public health services in the rural Andes.

**Table 3. Summary of the Bolivia Needs Assessment, Nlarch 1992**

| Topic | Findings |
|---|---|
| Data needs | Program decision makers wanted data to project number of cases, help identify problems and recommend corrective actions, and monitor programs and evaluate resource needs. |
| | Health officers from USAID wanted data to help Ministry of Health (MOH) plan for needed commodities and develop budgets. |
| | PAHO wanted data to help increase EPI vaccination coverage to 80 percent. |
| | Ministry of Health staff are concerned about a lack of skills in planning, management, and administration among public health staff. |
| Opportunities for decisions | Program decision makers wanted to decide on appropriate interventions and allocation of resources to competing priorities. |
| | Historically, resource allocation is determined to a variable degree by donor agencies. |
| | There will be a shift of decision making to the district level with decentralization of public health management in Bolivia. |
| Availability of data in 1992 | Last completed national census in 1979. Another scheduled for 1992, but denominator estimates currently used are unreliable. |
| | National health information system (SNIS) implemented in 1990, but not fully operational. |
| | Child and Community Health (CCH) financial accounting system ready for field testing. |
| | Special field projects (Macro Household Survey, Chagas Disease Survey, EPI immunization coverage surveys) implemented, but application and use for decision making limited. |
| Availability of computers | In federal MOH and Regional Health Offices, but not used for epi or programmatic analysis. CCH computers used for DDM project. |
| Trained personnel | 22 physicians completed CDC course in applied epi and biostatistics. CCH technical staff. Nur University staff. |
| Communication and feedback | Monthly SNIS data not communicated.<br>Program staff report activities to donor agencies.<br>Epidemiologic bulletin mentioned, but not located. |
| Training needs | Decision makers identified training needs in program planning, management, budgeting, data collection, data analysis, and communication. |
| | Practical training to apply tools in operational settings is needed. |

**Table 4. Summary of the Mid-Point Evaluation, August 1993**

| Topic | Findings |
|---|---|
| Description of DDM participants | A total of 41 health professionals were enrolled in DDM project, of whom 39 completed the course. All physicians working in public health.<br><br>14 positions reserved for individuals who had completed the 1990 CDC course in Atlanta; 8 for CCH personnel; and 4 to PAHO Expanded Programme on Immunization (EPI) national advisors.<br><br>8 worked at national level<br>24 worked at regional level<br>7 worked at district level |
| Decision making responsibilities of interviewees | Less than one-half of the participants administered funds, purchased equipment or supplies.<br><br>One-half of the regional and district participants did not take part in developing policies in their areas of responsibility. |
| Regular uses and analysis of data by participants | Prepare program reports<br>Surveillance<br>Specific research in disease control<br>Analysis of SNIS and other activity data<br>Prepare program and financing proposals |
| Barriers to use of data by participants | Lack of clear indicators of program performance<br>Inadequate data collection forms<br>Limited training of health care workers<br>Limited access to computers |
| Reported changes due to DDM training | Broader perspective and concept of their work<br>Better management and prioritization of activities<br>Increased analysis and utilization of data<br>Better use of computers and Epi-Info<br>Better written reports and proposals<br>More sharing and interaction with co-workers |
| Impacts in the MOH | Greater participation of the National Epidemiology Office in influencing national decisions<br>Participants serve as resources for analytic techniques and reporting methods<br>More teamwork |
| Negative comments | Too much attention to EPI at the expense of other programs<br>Omission of area-level personnel results in poor data submission from areas<br>Lack of coordination between CCH and Regional Health Offices |

doing epidemiologic surveillance. Interviews with MOH officials who were immediate supervisors of the 27 participants in the Becht evaluation failed to turn up much evidence of an impact of DDM at the agency level. Five out of six supervisors who agreed to be interviewed reported that their staff were already doing a good job and that they did not observe a visible change. There seems to have been a limited impact on policy. Most participants reported that they "adapt national policies to local conditions" rather than making their own policies.

The evaluators asked six participants to develop a strategy to address Bolivia's high rate of maternal mortality. The results of this exercise were somewhat incoherent. All six respondents pointed to the need to identify the problem and analyze data to determine its extent and pattern in the district. Only one participant each thought it would be necessary to formulate hypotheses, test hypotheses with field work, or communicate results. However, four of the respondents said that, prior to DDM, they would have simply accepted national data at face value and would not have ¡nvestigated the problem at the local level.

## The Bolivian Context

The Bolivian Secretaria Nacional de Salud (SNS) regulates a broad health system that includes disease prevention and control, but also provision of medical services to most Bolivians. Public health programs are delivered by SNS but also by a number of external organizations, PAHO/WHO, public and private medical providers, mission facilities, and local health promoters. Coordination of this complex system of health organizations is a major function of SNS.

Public health jobs in Bolivia are hard to obtain and very desirable. Bolivian informants ¡ndicated to us that there is one physician for every 900-1000 Bolivians, far too many to be financially supported by the economy. Moreover, physicians are poorly distributed, with the vast majority located in urban areas. Our informants in Bolivia commented on this problem:

> "A particular problem is lack of continuity on the job. There are around 8,000 physicians in the country for 7,000,000 population (around one physician for 900 population). Therefore, not all physicians have jobs, and government employees are fired with every change of political appointees . [In my agency], there were four changes in the La Paz regional representative in one year." *[National Program Director]*

> "[There are few] physicians in the countryside. There are over 10,000 physicians in the country. All *municipios* have physicians, but not all health centers. Physicians will need incentives to go to the villages." *[regional epidemiologist]*

Many parts of rural Bolivia are served by physicians recently graduated from medical school who are serving a mandatory year of service before moving on with their careers.

The over-supply of physicians in cities means that it is difficult to make a living in clinical practice. Many incumbents in SNS positions at all levels are replaced after each political election. From a systems perspective, this problem is less serious than it may appear, since many physicians who are displaced from SNS positions by shifts in political fortunes find similar employment in one of the approximately 500 privately funded external organizations that administer categorical health programs in the country. Nonetheless, every change in political administration is disruptive and creates special problems in building programs for infrastructure development.

## Decentralization and Reorganization of the Bolivian Health System

Significant changes have occurred in the organization of health and other social services in Bolivia during the three years since the implementation of DDM in 1992. At the time of the first visits by CDC in 1990, the Bolivian Ministry of Health (MOH) presided over a system organized into 11 *Unidades Sanitarias* or regional health departments. These were subdivided into about 100 Districts. Administration of programs occurred largely at the district level with planning being a regional or national function.

A number of legislative reforms enacted in April 1994 created the *nuevo modelo sanitario* (roughly, the new model for health) that defined health as a fundamental human right and moved its administration from the Ministry of Public Health and Social Support (MSPPS) to the National Secretariat of Health (SNS) under the Ministry of Human Development.

From the perspective of public health, these were significant changes in the social locus of health planning and decision making under the Law of Popular Participation (LPP). The LPP moves some of the responsibility for health planning from the district level to 305 *municipios*. The administration of health under the LPP is presented in Figure 1.

The LPP builds on traditional community organizations-the basic territorial organizations *(OTBS - Organizaciones Territoriales de Base)-as* the fundamental units of decision making at the

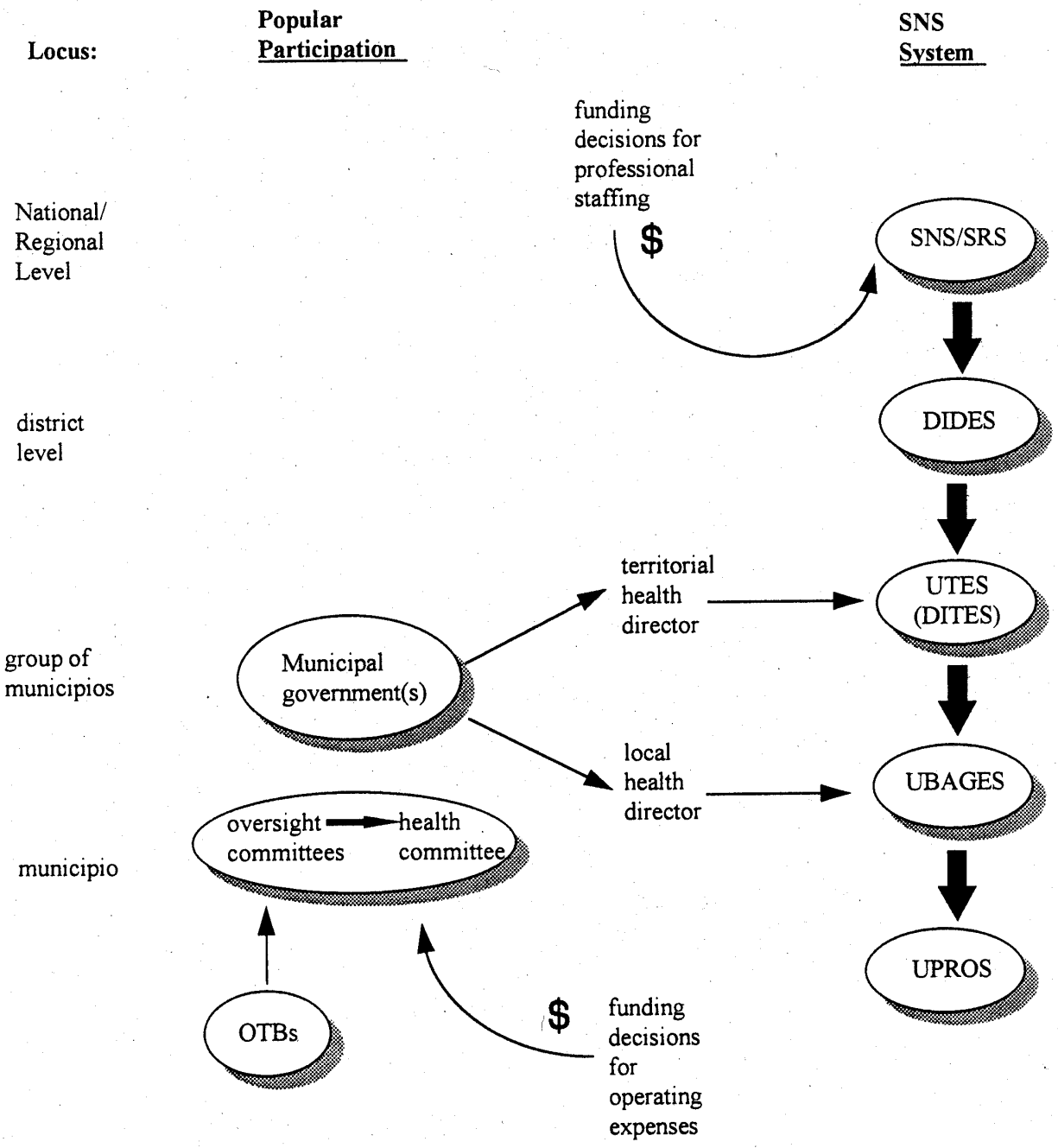


**Figure 1. Administration of Health under the Law of Popular Participation as of December 1, 1995.**

local level. There can be multiple OTBs in a community. The OTBs select individuals to serve on an Oversight Committee (*Comite de Vigilancia* one subgroup of which deals with health-related questions (the Health Committee or *Comite de Salud*) .

The technical aspects of the health system remain under control of the SNS and its regional components, the *Secretarias Regionales de Salud* (SRSs). SNS acts through a hierarchy of organizations defined on the basis of territory. The minimal unit in this system is the *Unidad de Programacion de Salud* (UPROS). An UPROS is any health service delivery unit from a tertiary care hospital to a traditional health worker. UPROS are administered by *Unidades Basicas de Gestion de Salud* (UBAGES). UBAGES contain at least one UPROS but normally contain many. A rural UBAGE may cover several municipios.

*Unidades Territoriales de Salud* (UTES)-formerly called DITES (*Dirreciones Territoriales de Salud*)-are defined on a territorial basis as the minimal geographic extent required to assure that the population has access to the entire network of health services, up to and including specialty hospitals. This is also the unit charged with training public health staff, providing technical assistance to UBAGES, and organizing responses to epidemiological problems requiring an inter-municipal approach (as would often be the case for infectious disease outbreaks).

Under the LPP, the *Comite de Vigilancia* is empowered to make decisions about spending priorities from the *Coparticipacion Tributario* (CT), a fund made up from a percentage of taxes imposed on businesses by the national government. The CT is a fairly small amount of money, allocated to communities on a per capita basis. It is to be used to fund facilities and operating expenses (including support staff) as determined by the municipal committees and executed by municipal governments. The committees must allocate funds among competing community priorities including clinics, schools, roads, and municipal facilities.

Decisions about health funding are communicated from OTB committees through the municipal governments to the Local and Territorial Directors of Health who are employees of the UBAGES and UTES respectively. Control of funding and personnel policies for professional staff throughout the national health system remains with SNS.

We have dated this description of the new model for health because we are not certain that it will be implemented in this way. While the division of labor between SNS and municipios under the LPP is roughly the same in materials that we have from April of 1994 and in our field data, our field visit took place during a period of great uncertainty about the timetable for implementation of reforms and the nature of the events that were to happen as part of this implementation. For example, the

DITES were renamed UTES during our field visit, reflecting a shift away from the concept of the district as a defined territorial entity and toward the more flexible concept of the territorial "unit."

People throughout the SNS organization evinced a great deal of enthusiasm for the reforms to occur under the LPP. Everyone talked about it. And most people expressed a great deal of certainty about what was going to happen. Unfortunately, they were certain about different things. The LPP was scheduled to begin operating in January 1996, a month after our visit and the cut-off date for Bolivian data collection.

## The Sistema Nacional de Informacion en Salud (SNIS)

The *Sistema National de informacion en Salud* (SNIS) is the national system for data collection on health and disease that is used to support operational planning in the Bolivian Health Sector. SNIS data are compiled at the local level (the UBAGES) and submitted to district and regional *Comites de Analisis de information* (CAIs) for review, analysis, synthesis and planning, and support of operational and budget planning. The data are also passed to the national level to be compiled, summarized, and disseminated back down the hierarchy. CAls meet about every three months and occasionally hold additional meetings to address special topics, such as maternal child health or outreach, planning.

SNIS data are used to support annual operational planning to link services to needs, to assess how well local health organizations are meeting targets for outreach and preventive services, and to show the distribution of diseases like tuberculosis and chronic conditions. However, they are not timely enough to support response to epidemic outbreaks of infectious diseases-diarrheal disease, hemorraghic fevers, and respiratory diseases that are major health problems in Bolivia. CDC staff told us that DDM had no involvement with SNIS. Nonetheless, most of our interviewees in Bolivia at least mentioned SNIS as important to their work.

# 3.0 Evaluation Approach

In this chapter, we describe the evaluation methodology used in this study. Several steps marked the development of our study design. We sought to:

Define a conceptual model for how the program was intended to operate,

Derive study questions and indicators from the conceptual model,

Develop a research protocol to guide evaluation of the model,

Conduct data collection,

Complete data analysis, and

Assess observations against the conceptual model.

In this section, we discuss the first five of these steps. The results of our assessment appear in Section 5.

**Theoretical Specification of the Evaluation**

Our first task in developing an evaluation approach was to describe how DDM/Bolivia was conceptualized by those who designed and implemented it. The evaluation then compared what the program was supposed to do with the actual results of its implementation.

Development of an evaluation concept required specification of the initial design of the program, a discussion of known events surrounding program implementation, and development of a paradigm for assessing and attributing program outcome. Three kinds of information were used to develop an evaluation framework for this study:

What the program was designed to do at the outset,

What programmatic and contextual factors during the course of program implementation affected realization of the design and how, and

The extent to which the program as implemented led to achievement of the goals incorporated in the design.

The conceptual model was reviewed by CDC program implementors. The criterion for adequacy of the model was agreement of CDC program staff that the model was indeed what they were trying to do and what they had hoped would come of it. Program staff suggestions were incorporated into the study model before we proceeded further with design of the evaluation.

Figure 2 presents the conceptual model for DDM/Bolivia and suggests ways in which contextual factors may impinge on the program. CDC and CCH delivered workshops and technical assistance to Bolivian public health professionals that were to result in focused applications of data to public health problems encountered by participants in their jobs. Lessons learned in these projects were to be extended to public health practice through application of data to solving health problems. There was to be better problem identification and definition, better data management, better data analysis, and better communication of results to those who make strategic and policy decisions about public health. Improved data would then be used by policy makers to support public health decisions. Contextual factors may affect the ability of CDC/CCH to deliver the DDM program, or the capacity of Bolivian public health staff to implement and extend what they have learned, or the willingness of decision makers to make data-based decisions.

## Study Questions and Indicators

From the final conceptual model, we went on to develop study questions and instruments to guide the field study. Study questions were derived from the model for each possible linkage or path in the model. Study questions were used to develop interview instruments and to guide the analysis. Study questions derived from the model presented in Figure 1 are shown in Table 5.

Table b presents indicators for the study questions. To the extent possible, indicators were constructed using CDC's recommended list of indicators (see Appendix A). These are qualitative indicators, that is, they output a description for each case or interviewee. There can be a positive result (a hypothesized linkage is seen), a negative result (a hypothesized link is not seen) or, as very often.happens, a partial result. The usefulness of these indicators depends on the fidelity with which they are used (asked and documented), rather than on a uniform response.

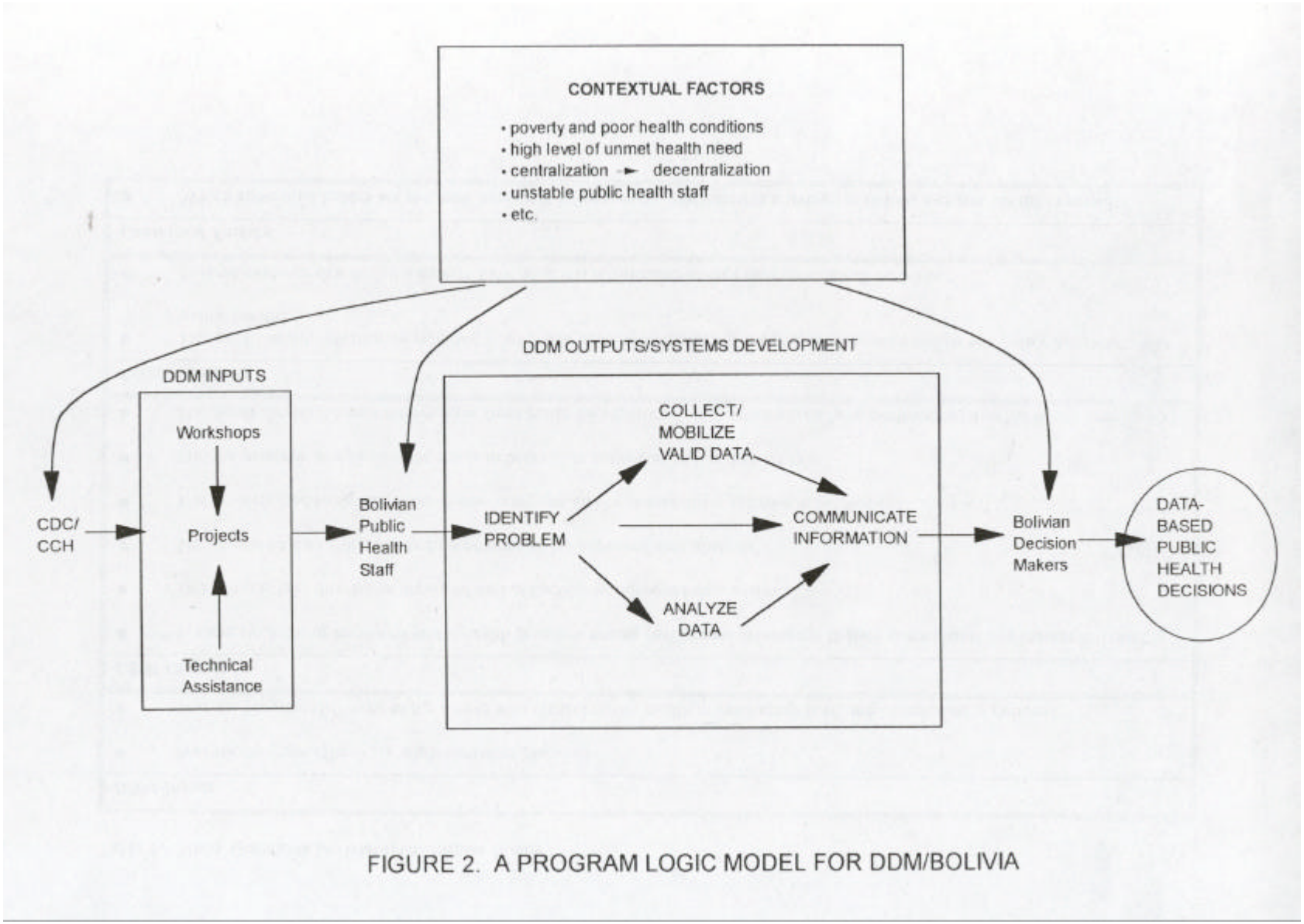


FIGURE 2. A PROGRAM LOGIC MODEL FOR DDM/BOLIVIA

**Table 5. Study Questions Derived from Impact Model**

*DDM Inputs*

Was the program effectively implemented as planned?

Was the program delivered to the people who control public health programming (i.e., implementation of policies)?

*DDM Outputs*

Is there evidence of improved public health practices among participants subsequent to their participation in program activities?

Did projects lead directly to improved data collection or improved data analysis?

Has improved data collection been accompanied by improved data analysis?

Did projects lead to development of new computer and/or management systems in public health agencies?

Did the presence of new systems result in better data collection and/or data analysis?

Has public health information resulting from better data collection and data analysis been communicated to the health community?

*Decision Making*

Has public health information resulting from DDM been disseminated to the people who make budget and policy decisions about public health?

Is there evidence that decision makers have used this information to support public health decisions?

*Contextual Factors*

Which contextual factors are the most important influences on public health activities in Bolivia and how do they operate?

Table 6. Indicators Derived from Study Questions

**Questions and Answers**

*Was the program effectively implemented as planned?*

Workshops led to projects that were feasible and practical within the conditions under which they would be implemented.

Projects were implemented as planned.

Projects as implemented reflected principles presented in the workshops and input from technical assistance visits was incorporated.

Participants had access to resources needed to implement initiatives (staff, resources).

*Was the program delivered to the people who control public health programming (i.e., implementation of policies).*

Participants were working in or with public health agencies at the time of their participation (broadly defined to include donor agencies, hospitals, etc.)

Participants remain in a position to diffuse the results of DDM training to other practicing members of the Bolivian health system.

Participants were in positions to implement their initiatives (e.g., supervisors, department heads, etc.) at the time of their participation.

*/s there evidence of improved public health practices among participants subsequent to their participation in program activities?*

Participants can give concrete examples of skills that they acquired during their participation in DDM and ways in which they have used them.

Participants have received full or partial funding for a plan developed using DDM-acquired skills.

Participants can demonstrate use of DDM-acquired experience to perform a systematic problem analysis, cost-effectiveness analysis, or priority-setting exercise since the national conference.

Participants working with the Expanded Programme on Immunization (EPI) program can cite concrete ways in which DDM has impacted on program operations.

Participants who have implemented a plan using DDM-acquired skills have built an evaluation component into this plan. If implementation is complete, results of this evaluation should be available.

*Did projects lead directly to improved data collection or improved data analysis?*

Skills acquired during DDM training have been extended beyond projects to result in changed procedures for collecting and analyzing data.

The kinds of data collected have grown beyond the program or public health area that was the focus of the DDM project.

Participants can give examples of new data collection instruments since DDM ended and such changes can be linked to DDM-acquired skills.

*Has improved data collection been accompanied by improved data analysis?*

There is evidence that data collected using DDM-acquired skills have been analyzed, rather than remaining unanalyzed.

There is evidence that data collected using DDM-acquired skills have been disseminated in a form useful to public health planners and implementors, rather than remaining unanalyzed.

Table 6. Indicators Derived from Study Questions (continued)

**Questions and Answers**

*Did projects lead to development of new computer and/or management systems in public health agencies?*

Participants can give examples of changes in computer utilization in the period since DDM ended and such changes can be linked to DDM-acquired skills.

Participants and non-participants in the health sector can give examples of inter-agency coordination and communication due to DDM-related activity (even if they don't know that it is DDM related).

*Did the presence of new systems result in better data collection and/or data analysis?*

Information Analysis Committees (CAIs) in participant areas hold regular meetings and produce data that are disseminated and used.

Participants can describe data collection and data. analysis for an epidemiologic investigation using DDM-acquired skills

*Has public health 'information resulting from better data collection and data analysis been communicated to the health community?*

Participants have developed and implemented public information activities to disseminate information resulting from DDM-related activities.

Non-participants in (lie health system have become aware of and used data produced by DDM participants (even if they don't know it came from DDM).

Participants have published the results of data collection and analysis in the Bolivian health literature.

*Has public health information resulting from DDM been disseminated to the people who make budget and policy decisions about public health?*

Public health staff working with the Expanded Programme on Immunization (EPI) can specify ways in which DDM has impacted on this program.

Participants have made presentations to higher level officials using DDM-acquired skills subsequent to the ending.of DDM Phase I.

DDM is known and viewed favorably by public health decision makers.

*Is there evidence that decision makers have used this information to support public health decisions?*

Officials from the Ministry of Health and from donor agencies are aware of information that has come from DDM participants and can give examples of its use.

Officials from the Ministry of Health and from donor agencies are willing to fund or have funded plans prepared by DDM participants or their colleagues using DDM-acquired skills.

Officials from the Ministry of Health and from donor agencies can distinguish DDM from other training programs and can discuss the advantages and disadvantages of alternate approaches to building public health capacity in data collection and data analysis.

Officials from the Ministry of Health and from donor agencies working with the Expanded Programme on Immunization (EPI) can specify ways in which DDM has impacted on this program.

We have avoided quantitative (percent or number) indicators because we feel there is little to be gained by presenting simple percentages of participants with a "hit" on these indicators given a denominator of nine. Even with a larger number of interviews, we are uncertain *a priori* about the implications of a particular response for the goals of DDM. For example, it requires skillful probing to attribute observed responses to DDM as opposed to some other training initiative or to idiosyncratic factors affecting individuals (e.g., individual efforts, random staff turnover, etc.).

## The Research Protocol

Battelle developed a research protocol to govern data collection and data management. The protocol, as revised November 9, 1995, served as a standard procedural guide for members of the evaluation team in all phases of the research from initial data collection to final analysis. Deviations from these procedures were avoided to the extent possible. Any deviations that occurred were documented in writing and included in the project record. These deviations are described in this report if we believe they may have influenced the thoroughness or uniformity of data collection.

## Data Sources

Two major categories of data were used in this study: interview data and documentary data. Interview data came from six categories of respondents:

*DDM participants* were Bolivian health officials who participated in DDM Phase 1 interviewed to document their experience in DDM and its impact on their practice of public health.

*Non participants in similar jobs* were public health officials in Bolivia with jobs similar to those who participated in DDM to provide a baseline for comparison of capabilities 18 months after the ending of DDM Phase 1.

*Officials in the Bolivian Secretaria Naciondl de Salud* to discover the effects of DDM on public health policy and decision making in the Bolivian public health sector.

*Officials in external organizations (NGOs), i.e.,* organizations outside of the Bolivian government that deliver health programs in Bolivia, to ascertain the impact of DDM on data and management systems in programs operated by these agencies.

*CDC and CCH personnel who were involved in program implementation* to understand what the program set out to do and what events affected implementation.

*Staff of local health units,* one rural and one urban, to document the state of computer and management systems in an operating setting and to assess the potential impact of the Law of Popular Participation on local public health systems.

Documentary data were. utilized as follows:

Previous needs assessments and interim program evaluations conducted in connection with DDM helped us to assess the fit of the program with the baseline needs of the Bolivian health sector and to document the process of program implementation.

DDM course materials were a source of information for understanding what the program set out to do.

Interim technical assistance and progress reports provided data on the implementation process.

Final reports of DDM on-the-job applications provided information on DDM outcomes.

A cross-walk of data sources to study questions is shown in Table 7.

**Instruments**

Interview instruments (appended to this document as Appendix B) were developed as part of the research protocol. A cross-classification of instruments by types of interviewees is shown in Table 8. Instruments were translated into Spanish and forwarded to CCH staff for verification prior to our arrival in Bolivia. The instruments were used as revised by CCH.

Interview instruments were constructed by matching indicators in Table 6 to data sources in Table 7. Questions were constructed that, with expert probing, would produce the data needed to assess the indicators across all interviews. Not all information for all indicators was be elicited in each interview, although we endeavored to ensure that multiple sources of evidence are collected for all study questions.

Instruments were open-ended and their effectiveness depended on the skill with which they were administered. An initial plan to train interviewers in the use of the instruments a week before the initiation of field data collection was disrupted by the U.S. federal government shut-down in

Table 7. **Study Questions by Data Sources**

| Study question | Data Source | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Was the program effectively implemented as planned? | √ | | √ | √ | √ | | | √ | √ | √ |
| Was the program delivered to people who control public health programming? | √ | | √ | √ | | | √ | | | √ |
| Is there evidence for improved public health practice among participants subsequent to their participation in program activities? | √ | √ | √ | √ | | | √ | | | √ |
| Did projects lead directly to improved data collection and/or analysis? | √ | √ | | | √ | | √ | | √ | √ |
| Has improved data collection been accompanied by improved data analysis? | √ | √ | | | √ | | | | √ | √ |
| Did projects lead to development of new computer and or management systems in public health agencies? | √ | √ | √ | √ | | √ | √ | | | √ |
| Did the presence of new systems result in better data collection and/or analysis? | √ | √ | | √ | √ | √ | √ | | | √ |
| Has public health information resulting from better data collection and data analysis been communicated to the health community? | √ | √ | √ | √ | | √ | √ | | | √ |
| Has public health information resulting from DDM been disseminated to the people who make budget and policy decisions about public health? | | | √ | √ | √ | | | | | |
| Is there evidence that decision makers have used this information to support public health decisions? | | | √ | √ | √ | | | | | |
| Which contextual factors are the most important influences on the implementation of DDM in Bolivia and how do they operate? | √ | √ | √ | √ | √ | √ | | | | |

**Key to Data Sources:**

1. Interviews with DDM participants
2. Interviews with non-participants in similar jobs
3. Interviews with Ministry of Health officials
4. Interviews with staff from donor agencies
5. Interviews with CDC and CCH staff implementing DDM
6. Interviews with Bolivian staff in municipal health settings
7. Review of previous DDM needs assessments and evaluations
8. Review of DDM course materials
9. Review of interim technical assistance and progress reports
10. Review of final reports on DDM projects

**Table 8. Comparison of Planned and Actual Data Collection Activities**

| Category of Interview | Number sought | Number interviewed | Comments |
|---|---|---|---|
| DDM Participants | 9 | 9 | Participants interviewed all came from our list |
| Non-partipants in Bolivia | 9 | 5 | Most had some relationship to CCH_ or DDM Phase 2 |
| Ministry of Health Officials | 4 | 3 | 2 national, I regional |
| NGO Officials | 5 | 3 | Included a former national MOH official |
| CDC/CCH Implementors | Not specified | 9 at CDC, 4 at CCH | Adequate for needs |
| Local Health Facility Visits | I urban, I rural facility | 1 rural facility | No urban location identified by CCH |

November 1995. However, we were able to hold a meeting with visiting Bolivian staff to update our understanding of events in Bolivia at this time, and met with CDC staff who were commissioned corps and, hence, exempted from the shutdown.

Training in use of instruments was thus necessarily limited to a two-hour session on our first day in Bolivia. This was not an adequate amount of time to prepare a field team that was unfamiliar with ethnographic interviewing techniques to administer probes correctly and to push the inquiry beyond the questions on the interview instrument itself. We needed more time for discussion and role playing to assure that maximum advantage was obtained from interview time. The lack of training and practice in the interview instruments meant that some of the interview data were "thin" and limited to areas that we anticipated in instrument design. The opportunistic findings that are a strength of this "open" methodology did not emerge in many of the field interviews.

## Selecting Interviewees

Three categories of interviewees-SNS health officials, representatives from external organizations, and CDC/CCH staff-were chosen purposively because of their unique relationship to the DDM Bolivia program. The other three categories-DDM participants, a comparison group of non-DDM participants, and a local health operation-were chosen non-randomly, but in such a way as to minimize known sources of bias.

Interviewees at CDC were selected because they had been involved either in design of DDM/Bolivia or in its implementation or both. We networked to these people, beginning with the CDC Technical Monitor for this project and working out from there, asking interviewees for referrals to others. We completed a total of 9 interviews with CDC personnel.

Because of limited project resources and difficulty in contacting these individuals, we did not track down CDC staff who had left CDC or were stationed outside of the United States. Additionally, information received from CDC interviewees became repetitive and led us to believe that we had obtained an adequate understanding of the project from this perspective. An early plan to interview members of external organizations in the United States for additional background was also abandoned because of difficulty in contacting potential interviewees and limited project resources.

We selected nine DDM/Bolivia participants out of 39 eligible for interviews in the following manner. We reviewed the program from the March 1994 conference in which final reports of DDM projects were presented. Using the Spanish abstracts, we selected 15 participants on the basis of their

project descriptions alone. We chose those with projects that *looked strong* and *covered a range of areas* that would allow us to examine all of the DDM objectives.

"Strong" meant that the applications had clear objectives, the steps that they proposed were linked to these objectives, there was evidence in the abstract that the project had been implemented, and the program seemed likely to work based on previous research on effective public health programs. The "look strong" criterion was applied in order to target participants whose applications were likely to have been effectively implemented. We wanted to avoid failures because projects like this often fail for idiosyncratic reasons that imply nothing about process. With only nine interviews available to us, we did not want to expend a "degree of freedom" on projects that we suspected a *priori* would yield little information on what worked. Nonetheless, we were careful to conduct no reviews of the actual outcomes of projects prior to selection of interviewees. If a well-designed, apparently well-implemented project failed for idiosyncratic reasons, we would not have known this ahead of time and would not have selected against the project.

"Range of applications" meant that, across all participants interviewed, there were applications to support surveillance, bring data to bear on key public health problems, link data to planning and/or management, and improve data communication.

We then matched our list to the list of interviewees from the mid-point evaluation. We wanted some overlap of persons interviewed for that study. However, participation in the mid-point evaluation was not a criterion for making the initial cut, nor was anybody added to the list for this reason. Ten of the 15 candidates on our initial list were interviewed in some capacity for the mid-point evaluation.

We checked our notes from the CDC start-up meeting to see who was recommended by CDC staff who had delivered training for DDM/Bolivia. The instinct of program implementors can be a source of bias, but it also signals applications that program designers think best met what they had planned. In this case, too, no one was added to the list on this basis. Seven of the 8 persons mentioned in either of these contexts was already on the list of 15 based on independent assessment. Finally, from all of these sources of evidence, we ranked candidates, selected a core group of 9 and a list of 6 alternates.

Next, we developed a method for identifying Bolivian health professionals who had not participated in DDM to build a comparison group. This would allow us to compare skills in data management, analysis, and utilization for participants and non-participants from a similar context at a time eighteen months after the conclusion of DDM implementation.

We sought to match participants with non-participants doing a similar job in a similar organization, and not working directly with the participant. Non-participants could be in a different area of public health from the participant or in a different office. If a participant was no longer in public health, then he or she was to be matched with someone in a public health job similar to the one the participant would have been in had they chosen to stay in public health. Ideally, the non-participants would not have been enrolled in any other training program. However, given all of the training programs in Bolivia, we recognized that it would be difficult to find a capable individual who had not been enrolled in at least one program. We did not wish to select against competence and experience in order to obtain absolute independence, so we deleted this last criterion.

In order to understand the potential of skills acquired in DDM to have an impact on health in the era of decentralization, we wanted to speak to one or more health workers in situ, i.e., individuals working in the health centers where activities are carried out. Time limited the number of clinics or health centers that could be visited. We wanted at least one urban health center and one located in a rural area. Activities at the centers were to include a tour of the facility and at least an interview with the individual who supervises its operation. We also wished to meet with a group of health workers to obtain the kind of integrated group input only available in a group setting.

Arrangements for the field data collection in Bolivia were coordinated by CDC staff and the staff of CCH. A pattern of regular communication already existed between DDM staff in the United States and in Bolivia, and this method of handling logistics minimized the burden of this study to CCH and its cost to CDC. We prepared detailed written instructions for CDC and CCH specifying participants, to be contacted, laying out criteria for identifying non-participants, and describing the time and logistic requirements for scheduling interviews. In addition, Battelle prepared and circulated a one-page summary of the evaluation and its activities in Spanish for CCH to use in orienting interviewees to the study prior to our arrival in Bolivia.

Our design criteria for interviews are compared with the field activities in Table 8. Selection of participants went according to plan. One participant whom we requested had died and was replaced by an alternate. We did not have as many non-participants as we requested. When we arrived in Bolivia, only five non-participants had been identified. We requested additional non-participants, and CCH staff agreed to try to find them. However, on the fourth day of the field trip, they had not been successful. CCH staff were themselves heavily involved in their own annual operational planning meetings during the first week of our visit. We did not wish to put additional burden on them, so we agreed to stop recruitment with the five non-participants already identified.

Table 9 compares the positions of participants and non-participants at the time of our site visit and at the time DDM/Bolivia was implemented in 1992. The five non-participants were not as independent of DDM as we would have liked. Two of them were CCH employees, one in the national headquarters and one in a regional office. Two non-participants were directors of national programs, one was a professor of public health. One of the national program heads and the professor had been suggested as instructors in DDM Phase 2. With the exception of the professor, non-participants were comparable with participants who we interviewed in the level of their positions and their responsibilities.

We also asked to interview high-level SNS officials and individuals in policy-making positions in external organizations. We did not interview as many of these as we might have liked (three SNS officials-two at the national level and one at the regional level-and three external organization officials)." Our perspective on the perceptions or these officials is broadened by our interviews with participants, several of whom were still in important policy-making positions.

Our reliance on CCH staff to schedule interviews removed from us control over how hard we pushed to get interviews. We could only exert so much pressure on the considerable good will of CCH staff who supported our work. We had no direct access to government officials and officials of external organizations delivering health services in the country. 'We thus had no control over which officials were interviewed and how they were selected. CCH was very effective in getting us to the "right" people, but we were unable to search independently for input from government officials.

## Data Collection

Interviews at CDC were conducted both before and after field data collection in Bolivia. Interviews with five CDC staff were completed prior to preparation of the research protocol and supported theoretical specification of the study. Five additional interviews (one a repeat interview) were conducted after our return from the field and served to clarify and amplify our findings from Bolivia. In addition, we had an opportunity to speak with a visiting CCH staff member at CDC two weeks before leaving for Bolivia. This meeting oriented us to the context of the program in Bolivia, briefed us on DDM Phase 2 activities, and provided us with an opportunity for a preliminary review

[4] One of the external organization officials was a former sub-Secretary of Health, and hence overlapped two categories.

**Table 9. Types of Positions of Participant and Non-participant Interviewees in 1992 and 1995**

| | Types of positions at DDM startup in 1992 | Types of positions in December 1995 |
|---|---|---|
| **DDM** participants (n = 9) | - 1 national program director<br>- 5 regional program directors<br>- 1 district staff<br>- 2 NGO staff | - 1 national program director<br>- 2 regional program directors<br>- 2 CCH headquarters staff<br>- 1 district staff<br>- 1 local program staff<br>- 2 NGO staff |
| Non-participants (n = 5) | - 1 national program director<br>- 1 national program staff<br>- 1 CCH headquarters staff<br>- 1 regional CCH staff<br>- 1 professor in MPH program | - 2 national program directors<br>- 1 CCH headquarters staff<br>- 1 regional CCH staff<br>- 1 professor in MPH program |

of the instruments before initiating field work.

The field team consisted of the Battelle Principal Investigator, supported by three CDC Preventive Medicine Residents who were on assignment to provide technical assistance to CCH. Activities in Bolivia consisted of an initial briefing for DDM staff, eight days of data collection, one day of preliminary data analysis, and one day of reporting and wrap-up activities, including a final briefing of CCH and USAID staff. All activities in Bolivia were conducted in Spanish, except for the last part of the USAID exit briefing. On this occasion, it became clear that important information would be better presented in both Spanish and English.

Upon arrival in Bolivia, we met with CCH staff to brief them on the evaluation project and to solicit their input on issues that should be addressed to assure that recommendations would be useful to DDM project staff in the country. CCH staff were invited to discuss reservations about the evaluation and to raise questions about it. CCH staff expressed concerns about the long period of time that had passed since the National Conference in March 1994 and with continuing changes in the Bolivian health system. New information emerging at this meeting was incorporated into the data collection and analysis protocol.

Four field interviewers participated in the collection of interview data, two teams of two interviewers each. Team membership was rotated to diversify viewpoints and to match interviewers with interviewees specialized in their own areas of expertise. Interviews were scheduled by CCH staff in Bolivia, and a CCH staff member accompanied us to interview appointments to make introductions, leaving before the interview itself began. The presence of a CCH staff member at the introductions of the interview team was a matter of protocol, but was very helpful in gaining credibility for the interview teams.

Collection of interview data by two-person teams assured adequate recording of information and provided a validity and reliability check on interview results. Interviews were scheduled at least two hours apart. This permitted field staff to summarize and supplement interview notes on the same day, so that no information was lost. Under no conditions were more than four encounters (interviews or meetings) scheduled in a single day for an individual team.

All interviews were tape-recorded with permission of the interviewee. No one refused us permission to tape their interview. Regardless of taping, notes were taken by one member of the site visit team. Under no conditions was a tape the only record of an interview. The latter precaution avoided loss of data due to tapes that were unintelligible, should a tape be the only record of an

interview, lost or damaged. Tapes from two of 27 interviews were unintelligible because of high background noise.

We were advised by CDC before going to Bolivia that some Bolivian staff spoke good English. We found this to be the case. However, some CCH staff told us that it is hard for them to communicate with CDC due to limited comfort in English. Some of the people we talked to understand and read English very well but have trouble speaking. This may be more perception than reality-we often felt the same way-but we tried to be sensitive to this kind of problem. For this reason, we kept all communication with interviewees and CCH staff in Spanish.

It was not possible to guarantee anonymity to interviewees in this study because the identity of interviewees can be inferred from necessary parts of the data, such as their jobs or the description of their projects. Interviewees were advised of this at the beginning of interviews. All interview data were kept confidential, i.e., available only to staff directly involved in the project. Interviewees were assured that they would not be quoted by name, nor would any statement be attributed to them. No raw data will be released to anyone in the Bolivian Ministry of Health, any donor agency, or CDC.

## Data Management and Data Analysis

There were two levels of data analysis: a preliminary analysis in Bolivia and a final analysis completed after we return from Bolivia. When all data collection in Bolivia was completed, we reviewed the data and developed a preliminary set of results and recommendations. These results were compiled into a briefing report and presented to CCH and USAID staff for discussion and comment in a meeting in Bolivia.

Interview data were translated into English and typed into WordPerfect files in the field. On our return to the United States, interview notes were amplified and verified from tapes. Inconsistencies and uncertainties were reconciled by returning to the original tape recording of the interview. This served as a check on the validity and reliability of data. Corrected interview summaries were analyzed using Ethnograph®, a text analysis software.

The first step in text data analysis was developing a code book defining all model elements and study questions or "variables." Interview data were coded independently by the two interviewers who collected it and reconciled by a third person who understood the protocol but was not present at the interview. The first round of coding occurred in Bolivia. Reconciliation of interview codes was

completed by Battelle staff after the field visit. Uncertainties were resolved from tape-recorded interviews.

In coding of interview data, Coders were cautioned to code negative or evasive answers as well as positive statements. If no answer was received to an interview question on the instruments, it was to be coded "no answer." In this way we were able to distinguish failures to reply from cases where a question was omitted. Coders were also asked to use special codes for interview responses that they did not understand or for responses that seemed relevant to the overall purpose of the evaluation but were not reflected in the instruments. Such opportunistic findings were printed into a separate file and new codes were defined if this was appropriate on the basis of importance of information or multiple appearances of an unanticipated observation.

Once final coding was completed, Ethnograph® was used to assign codes to passages or fields within interview transcripts, condense data for specific "variables," and produce reports of findings on specific study questions or model elements. A completed analysis contained all comments across all interviews relative to a single item or "variable." These were then used to support data synthesis and development of conclusions. Reports for individual research questions were summarized to produce answers to study questions. These form the basis for the discussion of findings in this report. The analyses for participant interviews compiled for this study are presented in Appendix C. These have been translated from Spanish, abstracted from interviews, and re-written for grammar. The responses are randomly sorted within each variable category to protect the confidentiality of respondents.

# 4.0 Findings

Previous chapters have built on information we accumulated as part of our document reviews and preliminary research on the DDM program and its implementation in Bolivia. The discussion in this chapter is based on interview data collected between May 1995 and February 1996 at CDC and in Bolivia.

Interview data collected in Bolivia were coded using a codebook that operationally defined ¡ndicators and linked them to the study questions in the protocol. The variables in the codebook are defined as:

> *Program implementation variables if* they address issues related to the start-up and delivery *of* the DDM training program.
>
> *Program outcome variables if* they describe the skills acquired by individuals through the DDM program.
>
> *Program impact variables if* they assess the link between trainee outputs and the use *of* data for public health decision making.
>
> *Context variables if* they describe political, economic, or social forces that influenced the ability of the CDC/CCH to deliver the DDM program in Bolivia.

The linkage of the codebook to these categories is shown in Table 10. The codebook itself is presented in Appendix D.

In the following sections, we summarize the views of five groups of interviewees in Bolivia-DDM participants, DDM "non-participants," officials from the *Secretaria Naciondl de Salud (SNS),* representatives from local health units, and officials from non-governmental organizations and donor agencies-as they pertain to variables on program implementation, program outcome, program ¡mpact, and contextual issues.

Table 10. Description of Four Major Categories of Analysis Variables

| Category | Definition | Variables |
|---|---|---|
| Program Implementation | variables i ables that address issues related to start-up P and delivery of DDM . | IMPL SUPV TA PROB-C PTHEN PNOW , OTRNG, SELECT |
| Program Outcome | Variables that describe skills and outputs participants demonstrated after DDM | RLVNT, EXAMP, CAPAC, APPLIC, FUNDS, ANAL, COMPTR, MGMTI, MGMT2, FASE2 |
| Program Impact | Variables that assess the link between trainee outputs and the use of data for public health decision making | POLICY, COMC, USE, STAKES, CRED, TTA, NET |
| Context Issues | Variables that describe political, economic, or social forces that influenced the ability of the CDC/CCH to deliver DDM | NPOL, LPOL, CONTEXT |

## Recruitment of Participants for DDM

Participants in DDM/Bolivia were recruited using a mixed set of criteria. Everyone who attended the 1990 Atlanta course was eligible (22 people, 11 of whom participated in DDM). CCH then went to the Ministry of Health for additional nominations. Criteria used by the MOH were whether the person worked in an agency likely to profit from this training and whether the candidate's job involved the use of data.

We were assured by those who participated in the selection process that the initial selection was "not political" but based on the likelihood that the individual would be in a position to implement a project. Nevertheless, the first selection criterion (where an individual worked) led to the perception among participants and non-participants alike that the trainee recruitment was politically motivated. One individual who was not invited to participate felt that political factors were important in selecting trainees and that a disproportionate number of participants came from externally funded health programs.

There were 41 individuals originally enrolled in DDM, 39 of whom completed the course. In a cross-walk of the participant list in the Becht evaluation in August 1993 and the program for the national conference in March 1994, we identified 40 individuals listed. Eleven of these were national program directors, 20 were regional staff, and 9 were directors of district health programs. Of 37 participants who presented papers at the 1994 National Conference, 28 (75%) were still in the positions they held at the time of the Becht evaluation. Eight participants were from the PAHO/WHO Expanded Programme on Immunization (EPI), "a core group within the larger group of participants ... a driving force beyond DDM." Eleven of the participants had attended the 1990 Epidemiology for Action course in Atlanta. This information is summarized in Table 11.

CDC wanted a high level of participation in DDM activities. Participants were to be excused if they did not appear for workshops and scheduled technical assistance. However, we have no evidence that anyone was eliminated for non-attendance. There was also an understanding with the SNS that participants were to be on their jobs at the end of the project. There were several changes at SNS, and at the time of the interviews not all of the participants were in the same jobs; but they were still in the system somewhere, working in regions, districts, or in external organizations.

The positions of the nine participants we interviewed, both at the time of the national conference and at the time of our November-December interviews, are shown in Table 12. While all of the trainees interviewed for this study worked in mid-level public health positions, the focus of

Table 11. CDC Staff Teaching in DDM/Bolivia

| DDM Activity | CDC Staff |
|---|---|
| Development of Bolivian materials | · Marguerite Pappiaounou, EPO<br>· Mike Malison |
| Workshop l: Applied Epidemiology and Biostatistics<br>La Paz<br>August 24-September 4, 1992 | · Nancy Barker Division of Statistics and Epidemiology, EPO<br>· Robert Quick, Enteric Disease Branch, NCID<br>· Rebecca Prevots, Division of HIV/AIDS, NCPS<br>· Ava Navin, Scientific Information and Communications Program, EPO<br>· Brad Otto, Division of Field Epidemiology, EPO<br>· Steve Thacker, Director, EPO |
| Technical Assistance I<br>January 23-February 12, 1993 | · Brad Otto<br>· Becky Prevots<br>· Rob Quick |
| Workshop 2: Applied Management<br>Santa Cruz<br>March 15 - March 26, 1993 | · Wayne Brown, Public Health Management Consultant, EPO<br>· Mike Malison, Chief, Management Development, International Health Program Office, CDC<br>· Brad Otto<br>· Carol Robinson, Management Development Specialist, PHPPO<br>[Faculty of Nur University] |
| Technical Assistance 2<br>July 19-August 6, 1993 | · Mike Malison<br>· Wayne Brown |
| Workshop 3: Epidemiology and Communications in Public Health<br>Cochabamba<br>September 20-October 1, 1993 | · Wayne Brown<br>· Rick Goodman, Officer of the Director, EPO Editor, MMWR<br>· Mark Miller, Prevention Effectiveness Activity, EPO<br>· Ava Navin<br>· Brad Otto<br>· Rebecca Prevots<br>· Rob Quick |
| Technical Assistance 3<br>January 1994 | · Wayne Brown<br>· Ava Navin |

Table 12. **Positions and Responsibilities of DDNI Participants Interviewed for this Evaluation**

| | Position in March 1994 | Position and principal responsibilities in November 1995 |
|---|---|---|
| Jose Luis Baixeras | Regional Coordinator, CCH, La Paz | Same. Provide direction, technical assistance (TA), and management to the district health activities, including 52 health centers covering a population of 150,000 persons. He supervises 8 persons directly and approximately 80 indirectly. |
| Jorge Flores R. | Regional Epidemiologist, Cochabamba | Same. In charge of epi surveillance and outbreak response. Moved to another position when the government changed but the position was offered back to him because of his competence in cholera surveillance. Supervises 22 persons. No financial responsibility. |
| Oscar Gonzales Y. | Diarrhea/Cholera Coordinator, CCH, La Paz | Chief of Infant Health, CCH, La Paz |
| Yuko Hiramatsu de Odo | Regional Coordinator for Children under 5, La Paz | Since August 1994, area director in La Paz for children under 5..Her responsibilities are to coordinate epidemiology with the district urban and rural directors, with a focus on diarrhea and measles control. |
| Erick Machicao Ballivan | Regional Coordinator for Polio and EPI surveillance, La Paz. Also PAHO consultant for polio eradication | Same. Now also regional epidemiologist. Supervises 50 people. Produces the yearly plan for the Epidemiology Department, coordinates polio control activities. |
| Maria Luisa Melgar | National Director, STD/AIDS | Same. Manages the national program, sets directives for the organization of the institution, defines position descriptions, manages training of personnel, determines legal framework for program (e.g., legislation regarding sex workers). |
| Antonio Quiroga | District Director, Chapare, Valle Puna, Cochabamba | Same, but district changed to Sacaba. Still about the same territory. He is medical director with minimal financial decisions. More concerned with medical issues like surveillance, vaccination coverage. The number of people who in some sense work for him depends on the size and complexity of the hospital. |
| Rosario Quiroga M | National Director, EPI | Same. Management of the immunization program in Bolivia, including administrative tasks, strategic planning and evaluation. |
| Silvia Zapata S. | District Coordinator, CCH, Cochabamba | Work as technical assistance specialist in a foreign NGO doing a TB program in Cochabamba. Has a similar job in another primary care program. |

their public health efforts varied considerably. Among these interviewees were people who engaged solely in epidemiologic investigations and surveillance, people who were mainly responsible for the management of those epidemiologic activities, and people who were principally involved in strategic planning and policy making.

At the start of the DDM program, all of the trainees interviewed had enough authority in their respective domains to be able to implement their initiatives. At the time of our 1995 interviews, two of nine participants had been demoted or had lost a job, "for political reasons" in both cases. One of these had taken a lower position in the same agency. Another went to work part-time for a foreign health organization as a technical advisor. One of our interviewees was temporarily removed from a job but re-employed because, according to a non-participant interviewee, the agency found that they needed the surveillance skills acquired in DDM. We were unable to follow this up with the employer.

## The Workshops

The three workshops were delivered as planned in August 1992 (Applied Epidemiology and Biostatistics), March 1993 (Applied Management), and September 1993 (Epidemiology and Communications in Public Health). The applied epidemiology course emphasized statistics, Epi-Info, surveillance and outbreak investigation, with learning objectives that were very applied and linked to participants' jobs. Everyone conducted a descriptive study of an epidemiological problem. The applied management workshop was directed to helping participants define a problem, collect and analyze data, identify an intervention, develop a plan and a budget, and implement the intervention. The tools to achieve those tasks included strategic planning, operational planning, supervision, decision analysis, priority setting, logistics, finance and budgeting. Finally, there was a presentation session emphasizing communication.

Interviewees told us that communication was the component most missing from their previous training in health. In the communications module, there was a strong emphasis on practical communication skills needed in public health practice. CDC staff taught a writing skills course and the editor of CDC's *Morbidity and Mortality Weekly Report* adapted an exercise that had been delivered at CDC designed to show how to tease the important information from densely written scientific material for presentation to the press. In this exercise, each trainee crafted a report of an

article to reach a different target audience. These were then critiqued by CDC trainers, one of whom was still affectionately referred to by participants as "El *Tiburdn"* (the shark).

Bolivia was the first country to implement DDM. As a result, this implementation had a great deal of support from CDC in terms of staff interest. Numerous people came to Bolivia, "probably more than came to any other country." And those who came were experienced, senior CDC staff, often heads of important CDC programs. The CDC staff who taught DDM courses are described in Table 13.

Course materials had been developed collaboratively by CDC and Bolivian staff before DDM was launched. In addition, instructors for each workshop met to plan the course before going to Bolivia to deliver it. For the first course, instructors prepared for over a month by writing lectures, translating them, and reviewing case studies.

Participants were largely pleased with the workshops, as were other Bolivians from SNS and CCH who worked with implementation of the program. The practical orientation of the program and its linkage to on-the-job activities were very important to participants.

> "DDM is practical, on the job, research is part of the curriculum." *[participant]*

> "I did not have an education that was very well grounded in public health. For me DDM was extremely important in my professional life. It gave me a new vision, to do things in a way that is practical but more scientific, more opportunity to fix the deficiencies in my program." *[participant]*

> "[DDM is] practical, takes concrete cases, incites the trainee to collect data which was not frequent in Bolivia before, incites the trainee to analyze the data. Data were not used before for decision making." *[government official]*

> "DDM was well integrated with work, alternating work with academics and method was good." *[external organization official)*

Many participants contrasted the DDM experience favorably to other training they had had in epidemiology and public health that was more abstract, academic, and removed from their daily experience. The modules on communication in the first and third workshops were special favorites:

> "We had other courses in public health before DDM. They took us out of our jobs and everything. But they weren't good to decide what

Table 13. Breakdown of Partipants in DDM Phase 1 by Employment at the Beginning of the Course in 1992 (n = 40)

| | National | Regional | District | Total |
|---|---|---|---|---|
| Program directors | 5 | 7 | 9 | 21 |
| Epidemiologists | | 7 | | 7 |
| EPI coordinators | 5 | 4 | | 9 |
| CCH staff | 1 | 2 | | 3 |
| Subset that participated in 1999 Atlanta course | 2 | 7 | 2 | 11 |

> graphic would best represent something. To put the title of a table here. To ask what, who, when, and where. With a little practice in DDM, we learned to do that."
>
> "Above all, I think that one of the most important steps for a person who undertakes a job is communication. In this, I think that DDM was "super-estupenda. " They sent a professor who was a good person in her attitudes and in her preparation... She was one of the persons who affected us the most."

Implementation problems mentioned were unevenness in the preparation of participants for the courses, failure of participants to maintain their involvement with the course between workshops, and appropriateness of the course material to the Bolivian experience. Many participants felt that some of the case studies were not relevant to health problems in Bolivia. One commented that you can't just change place names and expect case studies to work, that examples must be drawn from real Bolivian experiences.

There was some feeling among both participants and CDC faculty that the background of participants was uneven and that this made it difficult to target training effectively. From CDC staff:

> "...It was over the heads of most participants. ... There was a huge disparity in ability and knowledge among the participants."
>
> "Instructors had to modify their lectures and remove some material because its level was too sophisticated and more emphasis was needed on basic epidemiological principles."
>
> ... Some of the Bolivian participants were not technically prepared to deal with the computer-based technologies used in the sessions. The lack of experience with computers meant that time had to be devoted to familiarizing these participants with computers, rather than ... to the content of the course."

From the perspective of participants:

> "There were many differences in skills at the beginning of the course among participants, and that was not beneficial for the course ... it would have been better if everybody already had basic skills [in epidemiology]. "

> "There were various levels of preparation of participants. Some were experienced. Some knew something and some didn't. Some needed more time to catch up."
>
> "DDM mixed people with too diverse backgrounds. Therefore, some people learned more than others."
>
> ". The background of the participants was too different and that affected the effectiveness of the training. Some learned more and some learned less."
>
> "DDM should be adapted to the background of students."

Additionally, CDC staff did not always have baseline information on what to expect in terms of the preparation and interests of students.

> "There had been a survey, kind of a multiple-choice test, on what do you know about case control studies, ~~etc.~~ to help, but I didn't have a lot of time to prepare. Anyway, you really don't know [what you need to do] until you get there."

The first workshop was the most problematic of the three in terms of the fit between instructor and participant preparation. This was the epidemiology and statistics training module; five classes consisting of morning lectures and afternoon case studies. The workshop was originally conceived as a mini-EIS course, but the instructors had to adjust their lectures and remove some material after realizing that the level was too advanced. The instructors felt that although the participants were eager to learn, most came from clinical backgrounds and needed basic training in epidemiologic principles.

The sessions in applied management and communications went better. The instructors felt that these sessions were more effective because they focused only on the basics and utilized more interactive teaching techniques. Instead of simply attending classes in epidemiology, trainees would clean and analyze actual sets of data, write up the results, and present the findings. The communications training module involved a similarly participatory approach. Trainees read a single scientific article and crafted reports geared to different target audiences. Presentations were videotaped and then critiqued by instructors and other trainees.

However, not everyone felt that things improved:

> "When [CDC staff] went back for the third course in advanced epi and communication, the class didn't know the basics, like how to define denominators. So they rehashed the basics again." [CDC instructor]

Some instructors felt that the improvement in later workshops was partly attributable to learning on their part.

> "[At the final visit], we knew what to expect from the trainees and allowed for more flexibility in the progress reports and lectures. [W e] knew where the students were coming from and had more realistic expectations of what the trainees could do and adapted to that expectation." [CDC instructor]

The language issue arose only once in connection with the workshops. At an early statistics workshop done by a non-Spanish speaking instructor, the translator was not sufficiently versed in statistics to present the material adequately in Spanish.

Cost-effectiveness training was administered under the Harvard DDM program. This seems to have been very confusing. Only one of our interviewees tried to do a cost-benefit analysis, but was unable to complete it because of uncertainty about how to compare the benefits to the costs. An external organization official who we interviewed, also familiar with this training module, described it as "quite confusing. "[5]

## Participant Projects and Technical Assistance

Projects undertaken between workshops were intended to be supervised in-service applications of skills learned, the core of the "on the job" focus central to the design of this program. The outcome was to be capacity-building on the job.

There were two independent projects for each participant.. Guidance on ongoing projects was to come from two sources: supervisory visits by CDC instructors about halfway between workshops and ongoing technical assistance from CCH staff within Bolivia. All of the participants we interviewed had at least gotten their projects to the point at which they were ready to be implemented.

[5] This is mentioned here because interviewees did not always distinguish between the "info-tech" and "policy-tech" components of the DDM design.

Seven of nine final projects were funded and/or had an impact on public health policy. These projects are briefly described in Table 14.

Consistent with the design of the program, CDC consultants made one visit between each of the workshops to provide technical assistance for DDM trainees. CDC technical assistance teams went to a location convenient to the work sites of participants, setting up appointments in Sucre, Santa Cruz, and Cochabamba as well as in La Paz. CDC staff attempted to review materials from trainees prior to leaving for Bolivia

Six of the nine participants interviewed found technical assistance delivered by CDC to be useful and appropriate, especially in data analysis, Epi-Info, and presentation skills and graphics. One person unsuccessfully sought CDC technical assistance on a cost-effectiveness analysis, but felt that other help he had received from CDC was very good.'

Participants' opinions were mixed on the amount of technical assistance coming from CCH. Two people, both working in projects with infectious disease epidemiology, felt there was inadequate technical help available when CDC staff were not in Bolivia. Three other participants mentioned that help from CCH was good, but two of these were CCH staff. One other person, not working directly with CCH, told us that "if problems came up, they could consult with another program. We also could-and did-telephone to CCH in La Paz for some problems." Three other persons mentioned seeking technical assistance on their projects from non-participant colleagues or other agencies. None of the participants gave us a concrete example of an instance of technical assistance outside of that provided by CDC.

From the CDC perspective, there was some frustration expressed with the experience of providing technical assistance.

> " When we came back to do technical assistance, people hadn't done anything on their projects. They didn't bring their data to the sessions. We wound up sitting down and outlining projects. Also the technical assistance team really didn't have enough time in each place."

Most participants felt that the CD C technical assistance was useful and applicable to their projects, although based on field reports of CDC staff, one wonders if they used much of what they

[6] See footnote 5.

**Table 14. Projects of Participants Interviewed**

| List of Projects |
| --- |
| An integrated plan for supervision of physicions in a rural health district. |
| National blood plan to control the transmission of blood-borne diseases. |
| New tools for monitoring rural health district activities and assuring follow-up. |
| Expand and improve surveillance of infectious diseases by bringing communities over 500 into the surveillance process. |
| A project to reduce mortality in children less than 5 years due to diarrheas, pneumonia, and undernutrition at a regional level. |
| Certification of poliomyelitis eradication in La Paz and El Alto. |
| Creation of clinical training centers at regional hospitals for management of diarrheal diseases. |
| National subsystem of supply for the Expanded Programme on Immunization (EPI, or in Spanish PAI). |
| A study of epidemiologic reasons for inefficient tuberculosis control in Cochabamba. |

learned. Some participants were prepared for the technical assistance visit and or applied technical assistance in the most useful way. Others either failed to appear for technical assistance sessions or came without products that were far enough along or well enough organized to be discussed.

These impressions are supported by field reports of technical assistance trips reviewed for this study. For example, a CDC report describing Epi-Info support delivered in january and February 1993 showed.that some participants were apparently unprepared to make use of the help provided. Of 34 participants contacted, 21 had used Epi-Info to process a data set and 13 had not, but many of these had been very basic applications. Thirteen reported little or no access to computers since the last workshop. Most of the activities that resulted involved taking participants through practice exercises similar to those used in the first workshop.

One CDC consultant expressed the need for more time during technical assistance visits to help trainees not only develop their projects, but review basic epidemiologic concepts. Another felt there should have been more local staff available to reinforce material from the workshops as well as more formal mechanisms of trainee supervision.

> "Better supervision of the students is needed to retain what is learned. Time must also be set aside to practice and reinforce what is learned. Local, ongoing support and supervision, or one regional person is necessary. One six-month follow-up is not enough to build understanding of concepts."

## Program Outcomes

Program outcomes are defined as changes in. public health practice subsequent to participation on DDM/Bolivia. There are two important considerations in assessing outcomes: (1) whether outcomes materialize; and (2) whether those observed can be attributed, wholly or in part, to DDM. We draw from documentary evidence and interviews with participants and policy makers in Bolivia to assess these questions. In looking at program outcomes, we are not only trying to see whether the public health practices of DDM participants are better than they were before DDM on the basis of self-report. We also wish to compare participants to non-participants on the basis of public health practices to see whether participants differ systematically from non-participants in performance of public health functions.

We identified outcomes to be addressed from the program logic model in Figure 2. These are changes in data collection, management, and analysis; better use of computer systems; and better communication of data to policy makers.

## Overall Changes in Public Health Practice

Participants were asked what aspects of DDM training had made the most difference to their own public health practices. The outcomes highlighted by participants themselves differed depending on their responsibilities. These are summarized in Table 15. National program directors emphasize planning and communication skills, while valuing the ability to use epidemiological data for planning. Regional staff focus more on epidemiology and data analysis skills. The district-level interviewee uses DDM skills in management of training of incoming physicians delivering services in his district. Interestingly, although no DDM degree or certification was conferred, two regional staff mention career-related aspects of DDM as an advantage. The one interviewee who is no longer working in SNS also commented on the career advantages from DDM participation.

We took into consideration the possibility that DDM applications could lead directly to better problem identification, data collection, data analysis, and data use without causing infrastructural change in public health agencies. This is an important distinction, since this outcome might look the same as that due to systems change. However, the two outcomes have different implications for long-range development and extension of DDM outcomes to other agencies, problem areas, or personnel. Systems change is more likely to lead to a sustained effect of the program and its diffusion than is a simple improvement in the practices of participants.

## Improved Data Collection and Data Analysis

We asked participants about the relationship of DDM to improved data collection or improved data analysis. We wanted to know not only if whether DDM had led to new ways to collect and analyze data but also whether the two had occurred together, i.e., had improved data collection been accompanied by improved data analysis? The work of participants and non-participants in public health functions that utilized data over the last three months is summarized in Table 16.

Informants felt that epidemiology and data analysis were important outcomes of DDM. Eight informants elaborated on this question, one had no comment. Almost all of the comments dealt with

Table 15. **Match of Public Health Position to Most Valued Outcomes**

| Position | Priority outcomes |
|---|---|
| National program chief | Training skills, communication skills, epidemiology (in that order). |
| National program chief | Annual planning based on epidemiological data; better able to prioritize responsibilities. |
| National program chief | Management component was the most important; now able to identify key points of a presentation when organizing a meeting. |
| Regional coordinator | Career advancement, epidemiology, communication, managerial skills but less so than his epi. |
| Regional coordinator | New concept of disease management as integrated preventive-curative services; improved managerial skills. |
| Regional epidemiologist | Certification as epidemiologist; communication skills and epidemiology; new ways of doing supervision of epidemiologic surveillance. |
| Regional epidemiologist | Better mobilization, analysis and communication of surveillance data. |
| District medical director | Training of incoming medical service physicians. |
| Technical assistance in an NGO | Skills in evaluation, training, and supervision helped her get her present job. |

Table 16. Comparative Analysis Applications of public health data in Most Recent Three Months

*DDM participants*

Analysis of breakdowns of population seeking services, coverage from municipal SNIS reporting to plan for health services in the district

SNIS and small surveys generated by community representatives and only internal monthly reports to the Secretaria. These reports are not used to her knowledge.

Studied immunization coverage and municipios at risk for vaccine-preventable diseases. Sought out groups ideologically opposed to immunization.

Worked with another DDM person to improve sensitivity of the operational case definition for cholera at provider level.

Uses data for cholera surveillance using Epi-Info and Quattro Pro to analyze.

Collects, analyzes, interprets, and disseminates surveillance data monthly. Information is disseminated through a monthly bulletin.

Does family censuses, plat maps, questionnaires for primary health care planning and tuberculosis control in rural areas.

No use of data in the last three months (2 participants).

*Non participants*

Always uses morbidity and mortality data to plan the supply needs of the districts. Also defines priorities in the provision of services in those districts based on morbidity and mortality data.

Compiles annual report and operational plan for 1994 for the TB program in Bolivia. Data are reported by individuals working in Districts under SNIS. SNIS defines which data are to be collected.

Doing cost-effectiveness studies to get data showing results. Also beginning to collect and manage surveillance data collected across multiple programs as part of participation in a coordinated program. Unit for statistical surveillance in SNS compiles all of the data for various units that use it.

Doesn't work with data directly as much as people who work with him and whom he supervises. Active in providing SNIS data from this area.

He used surveillance data while editing his book on disease surveillance in Bolivia but he did not analyze the data himself.

better analysis of existing data rather than new modes of data collection or outbreak investigation. One participant felt greater autonomy on the job because it is no longer necessary to request assistance from the PAHO advisor to analyze data. Another mentioned that DDM has helped staff to analyze the data that came from above-data that had formerly been largely unanalyzed. Some staff felt they were doing epidemiologic assessments they had not been capable of doing before DDM.

Although program implementors at CDC told us that DDM had not focused at all on the *Sistema Nacional de Information en Salud* (SNIS), better processing and utilization of SNIS data were important assets of DDM training for some. SNIS data are not fed back in a timely enough way to be useful in ordinary disease control activities at the local level. However, DDM enabled district staff to analyze the hard-copy data *("cuadernos")* that they submitted to regional authorities for SNIS.

> "DDM permitted me to do the analysis of the *cuadernos.* DDM prepared us to use this kind of information, to pull out the things that we needed. It helped us to use the CAI (Information Analysis Committee) data. This kind of data comes from each hospital and is compiled every month for each municipio. ... Here are data to make decisions. "

Another informant showed us some hand-written tables illustrating how she had used SNIS data on prenatal and perinatal care coverage to target underserved areas.

Most participants brought to their interview with us examples of how they now analyze and present data. Many informants mentioned data-driven activities and were able to describe specific application of DDM shells. For participants, data were used to support surveillance and planning for delivery of services. A team of two participants used DDM-acquired skills to adjust the cholera case definition given to clinicians after the existing case definition failed to detect an outbreak. Two participants had made no use of data in the last three months.

Non-participants also had used data for surveillance and operational planning. With the exception of one person interviewed, non-participants had less direct involvement with data analysis. This may be because they were less engaged in the use of data than were DDM participants. However, only two of the non-participants were active at the regional or district level in planning and implementing health programs.

## Use of Computers

We asked participants and non-participants about their present utilization of computers in performing their jobs and whether they had seen changes in computer usage over the past two years. We probed to investigate the extent to which more sophisticated use of computers had led to better analysis and dissemination of public health data. Their responses to these questions are summarized in Table 17.

Six of nine participants and three of five non-participants said that computers had become more important to their agencies over the past two years. Three participants attributed their own involvement in this shift to what they had learned in DDM. However, the shift toward computers in recent years appears equally strongly among non-participants.

Epi-Info and Harvard Graphics are popular software for participants and non-participants alike, although one participant was still having trouble working with this software. Another participant noted that most computer work is delegated to others and that he seldom uses the computer himself. He seems to have missed the point that Epi-Info can be a tool to support exploratory analysis and direct application of data by public health practitioners. Data that this person showed us as an example was hand-tabulated data prepared for SNIS reporting.

Whether or not participants presently had access to computers or hold jobs that required computer analysis, they felt that computer competency was a very useful DDM outcome:

> "My personal skills [in computers] improved particularly in Epi-Info and Harvard Graphics. Additionally, in [my agency] generally there has been improved computer use [since DDM]."
>
> "DDM much improved my control of Epi-Info. I went to the US in 1991 to study Epi-Info, but the whole thing was in English... I could manage it, but I could not manage everything it would do. The graphics are [also] very useful. We use them in the CAIs, the meeting of all of the doctors at the [regional level]."
>
> "I have applied Epi-Info, this was good. But my job right now is temporary and they require a different kind of reports. ... The use of computer packages helped a lot. If you can manage and apply data, you can react in very little time."

Table 17. Changes in Computer Use in Informiant's Organization in the Past Two Years

***Participants***

Did not use computers before DDM, started using computers when in DDM, she now uses Epi-Info for analysis of surveillance data and encourages her staff to do so as well.

There has been improvement generally in computers in his agency. Attributes improved personal skills to DDM, but not those in agency.

After DDM, was able to make his boss realize the importance of computers for data analysis and convinced the boss to go from one computer in 1992 to 3 in 1995.

Was very active in getting computers for all regional and national units of organization. Computers were used with Epi-Info, Harvard Graphics, and.Quattro Pro.

There has been some improvement in computer use but not enough. There are now two computers in his service.

Knows Epi-Info and Harvard Graphics now and didn't before, but not using the computer much now. Her hard disk is not working well and she is not able to get Epi-Info to work.

No changes. She doesn't use computers now because she has little access. There is one computer for the hospital where she is working, donated by the Catholic Church. They obtain computers from the same international sources that they get all other funding.

There have been no changes since DDM. Computers used for economic reports and SNIS data. Have trained a secretary and a statistician to use the computer. They do most of this work.

No information.

***Non-participants***

Large change in computer use in offices and in health. However, his input into this has been minimal as he has had problems with computers and doesn't use them much. Knows Epi-Info and WordPerfect but seldom uses them.

The number of computers has increased and more people are using them. Physicians and technicians are now using them more for graphics (Harvard Graphics) and analysis (Epi-Info).

The number of computers has grown in the past few years, from 10 to 20. All of the professional staff have been trained to use Epi-Info over the past three years. Have found Epi-Info to be very functional.

There has been little change in computer use in recent years. We have used computers effectively for a long time. Epi-Info is used for data analysis, Harvard Graphics for graphics, WordPerfect for word processing. They have no problem with Epi-Info. The tables are produced by her and by a secretary.

Does not have much experience in computers although he has one. His office uses Quattro Pro, WordPerfect and Epi-Info.

It may be that the positive experience of DDM participants with Epi-Info and other software packages will facilitate the transition from hard-copy data management to the use of computers, a trend that is clearly under way in Bolivia and likely to strengthen over time.

Exposure to computer management of epidemiologic data during DDM seems to have gone beyond simply reinforcing computer skills to supporting public health programming with better analysis and use of data. One participant told us that she has used new modes of data analysis to improve the methodology of her health programming and to discuss program priorities. For another, DDM resulted in new tools (forms for data collection) for monitoring rural health district activities and changed the procedures of information gathering for monitoring.

There has been some effort to build local-level capacity in computer management of data. In the rural clinic we visited, there is one (highly utilized) computer. Each district has been invited to participate in a regional project where three people-the administrator, the health educator, and a secretary-are to be trained in computerized data management for SNIS activities. However, the district was not to receive a computer to dedicate to SNIS. We found some opinion at the regional and national levels that computerization of data processing at the level of the health unit (UPROS) was neither necessary nor desirable. The amount of data to be processed at the local level is small and manageable and policy makers felt that computers would distract health personnel from the delivery of services.

## Communication of Information

Participants were asked for examples of ways in which they had communicated information to other members of the public health community in Bolivia through training and technical assistance. Overall, we were trying to see whether public health information resulting from better data collection and data analysis went beyond the group of DDM participants to the wider health community.

Training activities reported in interviews are summarized in Table 18. All of the persons interviewed, both participants and non-participants, provided some kind of training or technical assistance to colleagues within the domain of their jobs. However, six of nine DDM participants we interviewed had delivered training activities that were directly derived from activities completed as part of their DDM projects.

A colleague of a DDM participant gave us this success story, which illustrates the value of having DDM participants train others:

Table 18. Comparative Analysis-Training and Technical Assistance Delivered to Others in the Past Year

***Participants in DDM***

Used DDM course materials to prepare a module on epidemiologic surveillance he later taught in a binational Bolivian-Peruvian course. Especially used the materials about rates, proportions, objectives.

Provided formal technical assistance to rural physicians, to interns, and to students in post-graduate family medicine. Uses DDM modules on surveillance, basic statistics, and basic Epi, but not the case-studies.

Train doctors who come into the district to do obligatory social service to collect data needed for SNIS reporting based on DDM project.

Provide technical assistance to all the district workers on an ongoing basis. Example is helping district teams review and plan in monthly CAI meetings.

Taught courses on training for the comprehensive clinical management of the under-5 child base on DDM project.

Developed and taught epidemiology modules for three training courses for professionals.

Only occasionally and in informal settings, but wouldn't have been able to do it without the DDM experience.

Informally trained others,. based on what she learned in DDM.

Informally trained staff in the use of Epi-Info.

***Non-participants in DDM***

Informant's program provides on-the-job training to people who work in the program at the district level in the central office and in two training centers. She sometimes participates.

Frequently involved in training of providers in MCH, cholera, community health, program management.

Responsible for training of all district medical directors in **UTES and UBAGES and** all of the staff in his national program.

Works as a professor in an MPH program and as a special advisor to the Director of Human Resources of SNS.

Teaches public health and tropical medicine at a university.

> "[A health director] was a DDM participant. Before he entered DDM, he had limited managerial skills and his work was unremarkable. Since he entered DDM, he has trained his district team to analyze data, manage supplies, and use the data to define regions at risk for different epidemiological problems. He organized training of local mayors on health issues. As a consequence, mayors in his municipio have implemented health activities in their areas."

One DDM graduate used DDM course materials to prepare a module on epidemiologic surveillance that he later taught in a binational Bolivian-Peruvian course. He especially used the materials about rates, proportions, and objectives. Another graduate developed epidemiologic modules for other training courses in Bolivia based on her work in DDM.

### Utilization of Information in Public Health Planning

We assessed the management outcome of DDM by investigating whether participants had conducted data-driven planning since the national conference and whether this planning differed from the kinds of planning done by non-participants in the past year. These results are shown in Table 19.

We see no evidence that DDM led to changes in the kinds of planning occurring. Our. data show that participants and non-participants alike participate in annual, operational planning for their programs at whatever level they are operating. Those located in national directorates of public health programs participated in strategic planning. Except for cases in which development of a plan was part of a DDM project, planning was not affected by DDM beyond the increased capacity of DDM participants to mobilize data in support of all of their activities. But participants themselves reported using data in ways they didn't in the past to conduct the routine planning that is part of their jobs. This is a significant change:

> "The implementation of the [CCH] plan induced changes in the way data are used. For example, now decisions for prioritization of programs are made by municipios based on data specific to that municipio. For example, the old vaccination card was modified to become a "child health card" which is used as an instrument to follow up other aspects of health of that child and also for monitoring of the program. "

Table 19. Comparative Analysis-Contributions to Public Health Planning in the Last Year.

***Participants***

Worked on EPI planning for next 5 years and for next year. Also worked on an annual plan for an infectious disease unit. EPI plan funded and inplemented by donor organizations. Annual plan implemented by SNS.

Developed the annual programme for STD/AIDS, now being implemented.

Worked on the national Cholera Plan for SNS. Plan was implemented.

Did a yearly plan for her (geographic) area showing estimated prevalence/ incidence of indicators and goals for coming year.

Developed an eradication plan for polio and certification of Bolivia as polio-free country. Plan was funded and implemented.

Worked with MOH and NGOs to prepare an extension of project to train health workers in clinical management of diarrheal and respiratory diseases and malnutrition in children.

Made a plan for TB control as a consultant. Now doing a second plan for another organization. One of these projects was implemented, funded by external funds.

No planning in the past year because of political changes.

Does not participate in program planning.

***Non-participants***

Not in last year, but has done public health program planning in the past.

Plans service delivery on the basis of morbidity and mortality data. Decisions for prioritization of programs are made by municipios based on data specific to that municipio. Plan is implemented each year.

There is both strategic and operational planning for TB based on data as mentioned above. Priorities are first of all to treat known cases of TB. They used SNIS data to write the operational report that is distributed internally to officials in SNS and used to prepare proposals for NGOs.

Planned a curriculum for the MPH program and did a proposal for PROIS (Proyecto Integrado de Servicios de Salud) to improve SNIS. The plan was financed and implemented.

Do annual program planning to specify the money needed, the justfication, the general and specific objectives, the methodology, the activities, the human, mfrastructural, and financial resources needed. Implemented the program with about 70 percent of the funding they requested.

The former sub-secretary of health worked with CDC and the Bolivian MOH to set up the DDM project. He was very pleased with the results and felt the program augmented peoples' understanding of data. He believed that the course helped the participants very much.

We spoke with the Minister of Human Resources in the SNS. This individual is responsible for optimizing capacity and quality of human resources within the Ministry of Human Development, including on-the-job training. He had been in this job for only one month at the time of our visit and knew about DDM only superficially. The regional health director also had had no direct experience with DDM beyond his participation at the 1994 DDM National Conference where the projects were presented.

One of the external organization officials we spoke to was familiar with DDM, had participated in some workshops, and used some of the data. He also has worked with other DDM participants from SNS. His wife was a participant, and he believed he knew almost all of the participants. Some of the participants have worked with him on projects, presenting data and reports.

Another external organization official knew the program only tangentially, but had heard that it was a good project. She had given a brief lecture within one of the DDM workshops on management but did not really learn much about the project. She had no direct interactions with DDM participants.

## The Impact of Participant Projects on Policy Making

Two kinds of evidence would support the idea that the information produced by DDM trainees has been communicated to the key players. First, data produced by DDM trainees have led to changes in public health policy and administration. Secondly, donors have been willing to extend DDM projects or fund new initiatives proposed by the DDM trainees. Table 20 lists the examples given by trainees of information that has been reported to decision makers and the actions, if any, that were taken in response.

DDM participants who were themselves policy makers, i.e., heads of programming organizations, were the most able to make an impact with the results of their projects. One of these participants showed what DDM can do under optimal conditions. This participant mobilized data to document the danger of infection due to a lack of blood bank safety legislation and called a conference of professional societies to discuss the issue. This conference led to establishment of a National Commission that produced a legislative proposal for blood safety, which is currently in the

Table 20. Participants' Examples of DDM Outputs That Were Sent to Decision-makers

| DDM output | Recipient of output | Follow-up actions taken by recipient |
|---|---|---|
| Proposal to encourage community participation in detecting cholera outbreaks | Regional secretaries of Cochbamba and Santa Cruz | Proposal was not financed by recipients, but was partially implemented. |
| National cholera plan for the Secretary of Health | CCH, UNICEF, PAHO/WHO | Provided funding to support proposed activities. |
| Data on the epidemiological and clinical characteristics of acute flaccid paralysis cases in Bolivia | PAHO/WHO | Data were used to develop new ways to monitor polio surveillance activities. |
| Data to document process in polio eradication effort | International Commission for Polio Eradication | Certification in progress. |
| Data on immunization coverage to identify municipios at risk for vaccine-preventable diseases | Expanded Programme on Immunization, PAHO/WHO | Not specified. |
| Data from a national survey of blood banks | Health care professional societies | Formed a National Commission which produced a legislative proposal for blood safety. Law is expected to pass. |
| Annual strategic plan for the national program for control of STDs/AIDS in Bolivia | USAID, UNICEF, Republic of Holland, GTZ (Deutsche Gesellschaft fur Technische Zusammenarbeit) | Provided funding to support proposed activities. |
| Proposal to train physicians in the clinical management of diaarheal diseases | CCH, UNICEF, PAHO/WHO | Provided funding to expand the training module to include respiratory diseases and malnutrition. |
| Data to support annual strategic plan for the Expanded Programme on Immunization (EPI) | World Bank, Rotary International, USAID, and Bolivian government | Provided funding to support proposed activities. |

Senate. This project was chosen as the best of the DDM course.

Another participant's project helped to change immunization policy in the country. Specific consequences of the project were the development of a manual for vaccine-preventable disease surveillance, the improvement in the use of syringes and vaccines (diminished vaccine and syringe loss), and the creation of a national central vaccine storage. One of her projects, an evaluation of Expanded Programme on Immunization (EPI) surveillance, led to improved feedback to the periphery. Other participants were able to initiate their projects at the regional or district level at which they worked. One person worked on the National Cholera Plan for SNS.

In other cases, implementation of projects was either prevented or interrupted by political changes due to reorganization of health services with decentralization.

> "We have done no planning in the past year because there have been too many changes. The politicians have a very different perspective than we do. Everything is changing so fast. And things are still changing. We don't know what is going to happen."

> "The others were able to move their projects ahead and apply them. I haven't been able to do this. ... The [external organization that I work for] is very interested in applying DDM, but my supervisor isn't interested in Epi-Info."

Stability of DDM participants in their jobs was hypothesized to be a key factor affecting the impact they could have on policy. There was a perception at CDC and in Bolivia that political change had led many participants to lose their jobs. One non-participant colleague of a DDM participant related the following:

> "All of the cholera surveillance staff who were trained by DDM and competent in the use of data were relieved of their duties. During the last cholera outbreak, SNS had no data to identify the existence of an outbreak. They denied for a period that there was an outbreak. Finally, they had to call persons trained by DDM who were working at CCH to reorganize the surveillance system for cholera."

However, this perception was not supported by our data. Among our participant interviewees (selected before their current employment was known), only one had been demoted and one ousted for political reasons. Many Bolivian interviewees from government and participant interviews

observed that most of their colleagues from DDM were still working in the public health sector somewhere.

## Factors Limiting the Potential for DDM to Impact on Policy

There are limitations to the capacity of DDM trainees to make an impact on public health programs in Bolivia because of the way in which public health planning is done and because of uncertainty about the public health context in which participants will conduct the rest of their professional lives.

Interviewees from all categories of respondents in Bolivia raised issues of the ability of DDM participants to affect decisions-limitations that have little to do with their positions, their training, or the efficacy of DDM. The most important of these are the political nature of decision making in public health in Bolivia and inertia in the system.

The way in which priorities are set in Bolivia is clearly a key factor in the potential of DDM to influence them. Priorities are established at the central [national] level and are based on high-risk populations and socioeconomic status. They favor populations with high mortality but accessible enough for intervention. For instance, women and children are targeted because they are more at risk for disease. At the regional level, annual planning is based on existing SNIS data and projections concerning the population, the services available, and the epidemiology data.

An external organization official suggested to us that politics are very important in priority setting and decision making, but laying this aside, concrete information on specific areas and regions can decisively influence global decisions made, although such information is seldom available.

One official told us, and insisted when questioned again, that the way in which decisions are made has not changed in Bolivia in the last three years, and that while DDM trainees seemed to have good training, they could not alone change the whole system. Nevertheless, he stressed that if those working in SNS produced good data, it would be used.

Yet even as people are learning in DDM to use data and management to make decisions, changes above them will not support or allow them to act.

> "The financial models for services define the priorities more than technical needs or realities that are well known and researched. It is the financial means of implementation that is the hard part and that will define how things go. In addition, cooperation with international

> donors is part of this. This to some extent defines priorities." *[external organization official*

We heard a great deal about the impact of decentralization and uncertainty about the future of public health in Bolivia on all health functions including DDM:

> "There have been many changes in the politics and government in the last few years, making planning very difficult and no decisions are made in this environment. The regional offices are very debilitated by all the changes. It is difficult for people as there isn't enough stability to implement decisions." *[government official*

The role of international organizations in setting public health priorities was also mentioned. There was some feeling that Bolivian priorities were eclipsed by the dependence of much of the Bolivian health sector on categorical funding from external organizations.

> "We work in an international mode. [For external donors], birth control and family planning are the first priorities. I don't know how high a priority these issues are for Bolivia, but they are high for the external organizations who fund health programs here." *[Non-participant head of a national program.]*

> "The priorities of Bolivian government often cannot be funded because of lack of money. Funding for programs comes from international agencies that have their own priorities. Often funding from donors is categorical." *[external organization officials]*

There has been some movement on the part of the Bolivian government to incorporate the activities of external organizations into regional planning. Foreign aid organizations can no longer make their own decisions about what to do and how to do it completely on their own. Now they must follow the recommendation of the *Comite Interagencial* of the region, which defines what the foreign organizations can do based on current Bolivian policies. One of the purposes of this committee is to coordinate programs funded by external organizations in order to avoid duplication of services.

From the perspective of health workers at the municipal level, public health operational planning is routine and the data are used more frequently to decide what services to provide and how to allocate resources. Local programs are financed through allocations from SNS based on an annual

plan, and shortages of funding and staff are a major problem. Additional funds and resources come from revenues and donations generated by churches and external organizations. A local health director told us that their priorities were based on the realities of service needs and that they date from long before the last two years.

Possibly the dominant contextual factor affecting the success of DDM in Bolivia, at least from the perspective of Bolivian actors, is the impending decentralization under the Law of Popular Participation. Health professionals in the public and private sectors have interrupted their regular operations to monitor the progress of decentralization and its implications on the configuration of health care in Bolivia. DDM outputs can currently have little influence on public health decision making simply because public health decision making has come to a stand-still. One interviewee told us that there had been no planning done at the regional level in the past year because there were too many changes.

There was some disagreement among local staff about the likely impact of decentralized decision making on the health system. A health care provider felt strongly that the changes from reorganization at district and regional levels had improved the capacity of the local health authorities to address local problems, citing an example of a recent cholera outbreak in which local decision makers were able to obtain the equipment needed to manage it. However, a health administrator in the same unit disagreed that any significant changes due to reorganization were evident so far.

## Sustainability and Phase 2

Sustainability of DDM beyond Phase 1 was a key outcome in the conceptualization of DDM/Bolivia both at CDC and in Bolivia. At the time of our visit to Bolivia, a three-person team had been established under the Phase 1 Project Director to build a second phase of DDM to be delivered to district-level officials in the UTES. This is the group that will be responsible for the administration of health programs under the Law of Popular Participation. DDM Phase 2 was in needs assessment and planning phases at the time of our visit, and there was as yet no time table for implementation.

DDM has not led to an ongoing organization of public health professionals. No formal networking mechanisms have been established for DDM alumni. There are no regular meetings for DDM trainees, nor are there monthly bulletins to keep participants informed. As a result, trainees with local responsibilities have lost contact with many of those who work on national or regional

issues. Most of the trainees interviewed still maintained personal relationships with other trainees. One of these interviewees reported that he and two other DDM trainees consult with each other informally on data analysis problems. However, these three individuals are all employees of CCH, making it convenient to collaborate on a daily basis.

Some trainees reported that they now collaborated professionally with DDM trainees within and/or outside of their own organization. It is unclear whether their affiliation with DDM led to professional relationships, or whether their professional responsibilities made it necessary for particular trainees to work with one another. Nevertheless, when trainees did work together, there was a heightened sense of professional partnership. A trainee we interviewed reports that the professional contact between DDM participants was easy because they all speak and think in the same epidemiological terms.

## Recommendations of Participants for Changes to DDM

We asked for the perceptions of DDM alumni on what changes they would recommend based on their experience. Their responses were quite diverse, possibly reflecting the variety of their backgrounds and current employment. Some of their responses are presented in Table 21.

Perhaps the clearest message in this table is that it is difficult to please everyone. However, several themes recur. Computer software tools were useful, and people would have liked more time with them. People expressed approval of the applied nature of the course, but seemed to feel it was too intensive. Finally, the participants felt that the course should be directed to district and local staff who work directly in health programs.

We also asked a professor of public health who had taught in DDM how he would modify the course content to be more useful to participants. He felt that the epidemiology module did not need to be changed.. But, when challenged with a specific question about relevance of the case-control studies at the municipal level, he said that case-control studies were not needed at that level. He suggested more supervisory visits to the DDMs. The professor would increase the link between the MPH program and DDM with the objective of decreasing the dependency on foreign professors. He also thought that a diploma at the end of the course would be a useful incentive for participants. While this could be a self-serving suggestion, it is also one that arises often for health training programs in countries where participants must compete for scarce and highly prized public health jobs.

Table 21. **Suggestions from participants for Changes to DDM**

***Suggestions about course content:***

Trainees should use the same data they will use on their jobs for the course.

We need to know more about computers. We needed more time for this.

DDM would benefit from more courses dedicated to financial management, program evaluation.

I would make the course more basic, less extensive, use less technology (computers). It should be more concrete and include disease surveillance and outbreak investigations.

Phase I would have benefitted from more case studies, more Epi-Info and Harvard Graphics, more time for technical support.

Would have liked to learn Epi-Info more in detail.

Course should include how to elaborate a plan, how to sell a program to decision makers in resource allocation.

***Suggestions about course logistics:***

The on-the job part is very important. People shouldn't have to spend much time away from their jobs.

Would have preferred DDM to be an out of the job training, to have been given two years for the training by her employer.

Courses should last two weeks maximum. The three-week intensive course was too intensive.

I would train more people, and I would train them more slowly. Old people learn slower.

University recognition would improve DDM's "market value."

It would be easier to keep up if background documents or bibliography were distributed before the course.

***Suggestions about who should be trained.***

DDM should start training the teams of the Regional Direction of Health, including the Secretary, the Planning specialist, the person responsible for health services. Even the Alcaldes of the municipios who will decide the allocation of resources for health should be trained.

In the future, DDM should be oriented towards training of personnel at the municipio level, particularly to help them to have epidemiological and managerial skills.

DDM should be addressed to field medical officers and nurses,

DDM trainees need to be recycled for more training regularly.

# '5.0 Conclusions and Recommendations

In this chapter, we summarize our conclusions about the effectiveness of DDM Bolivia and make recommendations for improvements to the program as it is implemented in Bolivia and in other parts of the world. In the last part of this chapter, we speak briefly of the implications of the DDM model for improving public health capacity in the United States.

To return to the objectives of this evaluation, we set out to:

Document the process of program implementation in Bolivia,

Describe the outcomes of the program in terms of improved use of data for public health decision making, and

Compile data that CDC can use to design or modify other implementations of DDM that are now operating or that may be initiated in the future in Bolivia and elsewhere.

We address each of these objectives in this section.

## The Implementation of DDM in Bolivia

Overall, one gets the impression that Bolivian participants were very pleased with their DDM experience and that they profitted from it, especially in their ability to complete computer analyses of existing data. Implementation seems to have been logistically smooth, with materials showing up on time, instructors being qualified and prepared, participants eager and excited by the experience.

Course content was good. People seemed to have only minor reservations about what was taught. Some would have liked different case studies. . Some would have liked more computer time, some less. But, according to participants' the courses delivered material that was useful to them in their jobs. The major implementation problem was that DDM tried to deliver too much material in too little time. Some people thought that the course was too intensive (too much material per unit of time), others thought that it was too extensive (coverage was too broad). But almost everyone expressed this concern in some way: that there was not enough time for exercises, communication practice, discussions, software practice.

Partly this may be that course materials were adapted from EIS materials, geared to an audience with a more standard level of preparation. There certainly were some problems due to inadequate preparation of participants to take advantage of the opportunities presented by the materials. But mostly there just wasn't enough time to do everything.

Technical assistance provided by CDC between workshops was not effectively utilized mostly because participants were not adequately oriented to it or prepared for it. It may be that technical assistance was too far removed from the workshops to maintain continuity in the participant's projects, given the high demand on a daily basis for quick response that operates in public health agencies. Some participants were pulled away from their projects for other things and weren't able to be as close to completion as they had hoped when the time for technical assistance came.

The support available from CCH between CDC visits also seems to have been underutilized. Participants were aware that they could call CCH for help with problems as they arose, and CDC documents show that this was reinforced by CDC and CCH staff during workshops and during technical assistance visits. Support from CCH could have been accessed by telephoning for help, but none of the participants interviewed reported ever having done so.

Selection of participants seems to have been an unsystematic, or at least not a well documented, process. To some extent this will be true of any program geared to mobilizing decision makers where assembling key people is more important than the process for getting them. But the lack of clear professional criteria for recruitment into DDM resulted in a mixture of preparations and background that was a problem for those preparing and delivering course material. This is not to say that participants must be selected to be similar to one another. Sometimes diversity of experience is an asset in a practice-based program like this one. But very diverse groups require a different kind of curriculum and a different kind of preparation than do more uniform groups. It is essential to know how you are recruiting and what the implications of this are for course development.

## Outcomes of DDM\Bolivia

It is clear that DDM was effective in helping participants improve their use of data and link it to decision making in their management projects. The management and analysis of existing data sources, such as the Sistema Nacional de Informacion en Salud (SNIS), and the streamlining of procedures for producing data were reported by many participants. Even those who had failed to

¡mplement their projects (two out of nine participants interviewed) could give us an example of how they had mobilized and analyzed data and what these data implied for the public health activities in which they were engaged.

An important outcome in data analysis and data management was the development of more rational procedures to collect SNIS data. The major limitation of SNIS is that it takes the national government six months to turn it around. But it passes through everybody's hands on the way to the central government. District and regional people don't need to wait for national-level data to be published to use SNIS data. They produce it and meet to discuss and analyze it in district and regional Information Analysis Committees (CAIs). Therefore, measures to assure quality control and utilization of SNIS data is an important part of any participant's job.

The evidence across all of our interviews in Bolivia shows that computerization in the Bolivian health sector seems to have a life of its own. There needs to be no push to sell the advantages of computerization of as many functions as possible. Also Bolivian public health staff are well on the way to making Epi-Info a standard for analysis of epidemiologic data. Many DDM participants could not get sufficient access to computers between workshops to get the practice needed to become adept at Epi-Info. Without practice in using software to manage and analyze data, very busy people are unlikely to adopt this as part of their daily working life.

The outcomes of the management and communication aspects of DDM are less certain. It was clear from our interviews that participants could do these tasks, but few of them were doing so as a regular practice at the time of our visit. People are using packages like Harvard Graphics to support presentations, but only two participants reported having made presentations in the past year. We saw presentations made by participants working for CCH as part of our briefing with them. There were organizational charts and flow charts illustrating the linkages of project activities. They were impressive and useful, but were not designed to bring public health data to support policy decisions.

The "training of trainers" approach will be important in DDM Phase 2. We developed our line of inquiry about training of colleagues by DDM participants because they themselves brought this up in interviews as an important part of their jobs. But it is clear that public health responsibilities for training are widespread in the Bolivian health sector. Any program to enhance basic public health skills stands to benefit from this "multiplier effect."

## The Impact of DDM in Bolivia

The success stories from DDM/Bolivia are impressive indeed. Several important and interesting projects were implemented as a result of DDM that probably would not have been done-at least not in this data-driven and rational fashion-without the program. The development of Blood Bank Safety legislation on the basis of demonstrated risk of blood-borne infection is a model of the use of data to drive public health policy. There are other impressive projects as well.

Some of these projects were implemented by individuals who were themselves policy makers and in a position to implement their own projects. It is difficult to decide how much of this impact was attributable to DDM. It is likely that the national-level projects were better thought out and designed as a result of DDM than they might otherwise have been, but it is hard to tell whether these key public health programs would have been implemented at all without DDM. Directors of national programs must make decisions to implement some kind of national program. This is not the same outcome as a public health staffer at the district or regional level communicating data up the hierarchy to influence or support a decision by a superior. It would have been a more convincing impact to see changes at the district level where data had not previously been used at all.

DDM/Bolivia lacked involvement of public health planners, and the program provided few benefits to them. We found little evidence that DDM/Bolivia had built a structure for moving data from the epidemiologists who collected it to the public health planners in the public health sector who can use it to set public health priorities and budget allocations. DDM received early support from a single high-level health official who moved out of his political position a year after DDM was initiated. Other Bolivians implementing DDM were CCH professional staff working on this USAID-funded project to deliver maternal-child health programs to communities. There was no regular involvement of technical planning and budget, offices within SNS.

Our interview data on dissemination of information to policy makers in government and in external organizations showed that, with the exception of one individual with a close personal relationship to many people in the program, this did not occur. This is a significant breakdown in the process because dissemination of data will remain important for health planning even in the era of decentralization. Since decision making about the allocation of professional staff will still be made by SNS, there will still be a need to guide high government officials with information on the distribution of morbidity, mortality, target populations, and the need for services.

The impact of the management component of DDM/Bolivia is obscured by the changing Bolivian political structure and cannot be fairly be evaluated at this time. This is a very important impact because it lies at the heart of the desire of many Bolivian health personnel to move away from politically based decisions to more rational ones based on data. However, it is also true that it is in the nature of public health to be driven by political context. The contextual competence of a program like DDM depends on the degree to which it is able to maintain an impact on the application of data to health decisions, even if the mechanisms for making those decisions changes. The planned use of DDM Phase 2 to train district health officials to advocate for health priorities is a step in this direction.

The most important factors governing the impact of DDM at the present time are decentralization and the uncertainty that people have about public health jobs, while the precise steps toward implementation of the Law of Popular Participation are developed. There is no cure for this uncertainty. But DDM is about decision making at whatever level it occurs. There are some events that are likely no matter how local decision making is defined. Health service providers will still be responsible for compiling health information and moving it to the district and regional level. There will still be SNIS and the CAIS. And for employees of SNS, career decisions will still be subject to the factors that govern them today.

Neither CDC nor most Bolivians have any power to change national policy to advance the cause of DDM specifically or of "capacitation" in public health generally. Fortunately, this is not necessary. The access of marginalized populations to health services, health education and healthy environments is a political "value" to any administration that comes to power. DDM makes its contribution to better health for Bolivians by strengthening the capacity of health officials to be more effective in serving these needs, whatever administration they labor under.

An important infrastructural factor in Bolivia, as in many developing nations is the role of international donor organizations in setting health priorities. The goals of external funders are often categorical, limiting the degree to which national priorities can be realized in health systems relying heavily on such resources. A poor country is unlikely to argue for its own priorities with a donor agency that offers to fill a non-priority-but still pressing-health need. DDM functioned effectively within categorical restrictions, making a strong contribution to the Expanded Programme on Immunization, a PAHO/WHO program that addressed a key Bolivian health priorities. However, the potential of DDM to bring the data to bear on national health priorities in other countries may be

limited if DDM becomes "captive" to a donor organization with categorical programs less in line with national health objectives.

## Recommendations for Implementation

**CDC should require that DDM implementors in host countries develop clear criteria for including participants in the course.** It is not necessary, and probably political unwise for CDC to specify what these criteria should be. But knowledge of selection criteria is an essential support in developing training and technical assistance materials to be delivered to participants.

**CDC should package DDM materials so that self-study is an option.** Much of the material that supports DDM courses is standard from country to country. Materials can be developed in a standard module with case-studies and other materials prepared for specific countries. This will rationalize the DDM approach and standardize delivery across instructors. However, the most important advantage is that exercises and information can be given to participants to prepare for courses and to reinforce course materials between workshops. The use of standard modules can also expand usage of DDM materials beyond the core group of participants to other public health professionals in the country.

**DDM should be based on state-of-the-art technologies for training and communication.** There is a great deal of technology that is not being utilized for DDM. DDM should go beyond manuals and other documents to employ the range of communication technologies available almost everywhere in the world at the present time. This includes Internet access to updates and data, direct e-mail linkages to CDC, computer software, videotapes, and audio-cassettes. One possibility is the development of exercises. that could be shared with CDC advisors with quick-turnaround electronic feedback. The practicality of this recommendation depends on the costs of electronic access between participant countries and CDC. A single link between CDC and the host country would be sufficient to maintain contact with secondary dissemination within the host country. At the present time, e-mail communication is an important means of communication between CCH and CDC.

**CDC should work with in-country implementors of DDM to tailor a proactive procedure for supervising projects and helping participants through problem areas.** DDM shows us that participants are unlikely to call in for help. There needs to be a plan for linking participants with in-country supervisors and technical advisors that originates with the implementing organization. For this to be economically feasible, such a function must be performed by a local organization like CCH or by an external organization operating in the host country. A local organization is far preferable because then capacity will be built within the host country.

## Recommendations for Improving Outcomes

**CDC should explore building DDM in such a way that all participants are provided with laptop computers.** This would provide participants with the means to become adept at Epi-Info and other computer analyses at their own pace, and would assure that computers were handy for use in the field where contingencies arise. This would permit trainees to develop the practice of using computers on a routine basis, rather than just during DDM-related activities.

We recognize that this is a costly option, but the cost is going down. It is entirely likely that, long before the Year 2000 objectives are achieved, the laptop computer will become for epidemiology the central tool of the field. For about $2,000 per person, each participant could be provided with his or her own laptop. This would have added $80,000 to the cost of DDM/Bolivia. This much money could probably have been raised from a donor agency. And it would have provided people with the most basic tools to achieve the goals of the program. Trained people with good computers would represent real capacity. Even if laptops had been provided only to the first cohort of participants in DDM/Bolivia, this would have added almost 40 computers to the public health capital of the nation-computers that could have been accessed by colleagues of participants.

## Recommendations for Strengthening Impact

**CDC should articulate the benefits of DDM to planners and should seek participation of public health planners early in the DDM process.** DDM must be sold to planners as well as to epidemiologists in order to achieve buy-in from all of the players needed for DDM to achieve its objectives. But more than political support of policy makers is needed. Technical staff involved in setting health priorities and developing health budgets are needed to assure that DDM is realistic in

terms of how data can be applied to the planning process. In addition, the DDM process can itself begin forging the professional relationships that can lead to the application of data to decisions.

As part of the needs assessment preceding DDM, CDC and Ministry of Health staff should establish the locus within the MOH for budget and programmatic planning. Key persons from this organizational unit should be brought in prior to DDM implementation and should help develop specific methods for bringing data to bear on the decision-making process in their organizations. They should be present at important meetings and should participate in any important activities in Atlanta or at professional meetings. These same professionals should be kept involved, perhaps as members of an advisory group, throughout DDM implementation.

**CDC should build on existing public health practices as much as possible.** As part of preparation for implementing DDM, CDC should complete a careful review of what is available in host countries in terms of existing surveillance and health data. The CDC needs assessment for DDM\Bolivia, but conducted under the auspices of the Expanded Programme on Immunization, seems to have underestimated the importance of SNIS in public health practice in Bolivia. A search for opportunities to match DDM to existing structures helps ensure a program that will be maximally useful because it helps participants improve the utilization of the data they need to collect anyway. And it will help strengthen the existing health information systems, promote ownership of DDM, and foster acceptance of innovations resulting from its implementation.

**CDC should build procedures for handling political change into the DDM process.** The precise political changes that occurred during DDM/Bolivia are, of course, unique to Bolivia. But the fact of change is a common scenario in all countries in which CDC is likely to implement DDM. While it is not possible to predict what political changes will occur or when they will occur, CDC can be explicit about how to react when change does occur. Normally, this will be a simple process of pulling back from planned activities, taking stock of the short- and long-term impacts of the change, and modifying the plan to accommodate new circumstances to the extent feasible or desirable. But people may not think to reassess programs to accommodate change. Written, mutually understood procedures for handling political change can help avoid the situation in which program implementors march straight ahead with planned activities even though a readjustment of program objectives and the

means for reaching them is advisable. CCH's adaptation of DDM Phase 2 to meet the emerging needs of the Bolivian health system under decentralization is a model for doing this.

**CDC needs to reinforce the importance of dissemination of information.** This was a weakness of DDM/Bolivia. While participants are adept at communicating with other people in their workplaces, the information produced from the data is not moving up the system to central policy makers. One mechanism that would both improve dissemination of data from workers to policy makers and help create a sustainable. DDM infrastructure is the establishment of a professional network with a core of DDM graduates that would support later phases of program implementation. A DDM Alumni Association could be designed and incorporated into the procedures for implementing the DDM course itself. Someone, presumably the in-country implementing agency, must be charged with constituting this organization and maintaing it at least initially.

## Recommendations for Sustainability

**Build in to the design of DDM a more explicit statement of the training mission.** Participants need to understand that extending their training to colleagues is an important responsibility of their participation in DDM. The impact of. DDM on the health system as a whole can be strengthened by building into the DDM package, perhaps in the management section, an exercise in how to deliver training and technical assistance to staff in a public health practice. This will reinforce the value to participants of passing their experience on to others and will provide them with tools to do so.

## Implications of DDM for Public Health in the United States

In considering the impact of decentralization on public health in Bolivia, one is reminded of the potential for decentralization of these functions in the United States under most proposals for Block Grant funding. Like the Bolivians, health officials in the U.S. will face changes in the locus of decision making for public health priorities. The methodology of DDM-brief workshops with technical assistance in accomplishing on-the-job projects-would work as well in Georgia as it does in Bolivia.

Data for Decision Making is hardly a new concept in public health. It has been implicit in many CDC programs over the past few years. CDC should not overlook the implications of this project for building public health infrastructure in the United States. As CDC goes on to standardize and package DDM for use in other countries, they should also consider a similar program that can be used in the United States by state and local health officials facing new challenges in our own era of decentralization.